

# Chemical Age

**MONSANTO TO  
BE THIRD U.K.  
FUMARIC  
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(page 401)

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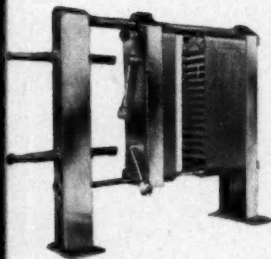
**11 March 1961**

THE WEEKLY NEWSPAPER OF THE CHEMICAL INDUSTRY

## For the continuous heating and cooling of chemicals

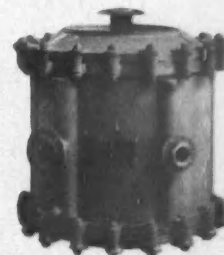
	ACETIC ACID SOLUTIONS				
	ACETIC ACID AND ACETIC ANHYDRIDE MIXTURES	ACETIC ACID AND VINYL ACETATE MIXTURES	ACETONE SOLUTIONS		CAUSTIC SODA SOLUTIONS
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	OLEIC ACID	OILS — COTTONSEED, LINSEED, LUBRICATING (TURBINE), GAS (DEBENZOLISED MINERAL TYPE), HYDRAULIC, MINERAL QUENCHING			MOLASSES SOLUTION
PETROLAGAR EMULSION	PHOSPHORIC ACID SOLUTIONS	PHOTOGRAPHIC DEVELOPER SOLUTIONS	POLY-VINYL ACETATE EMULSION	POTASSIUM CARBONATE LYE	
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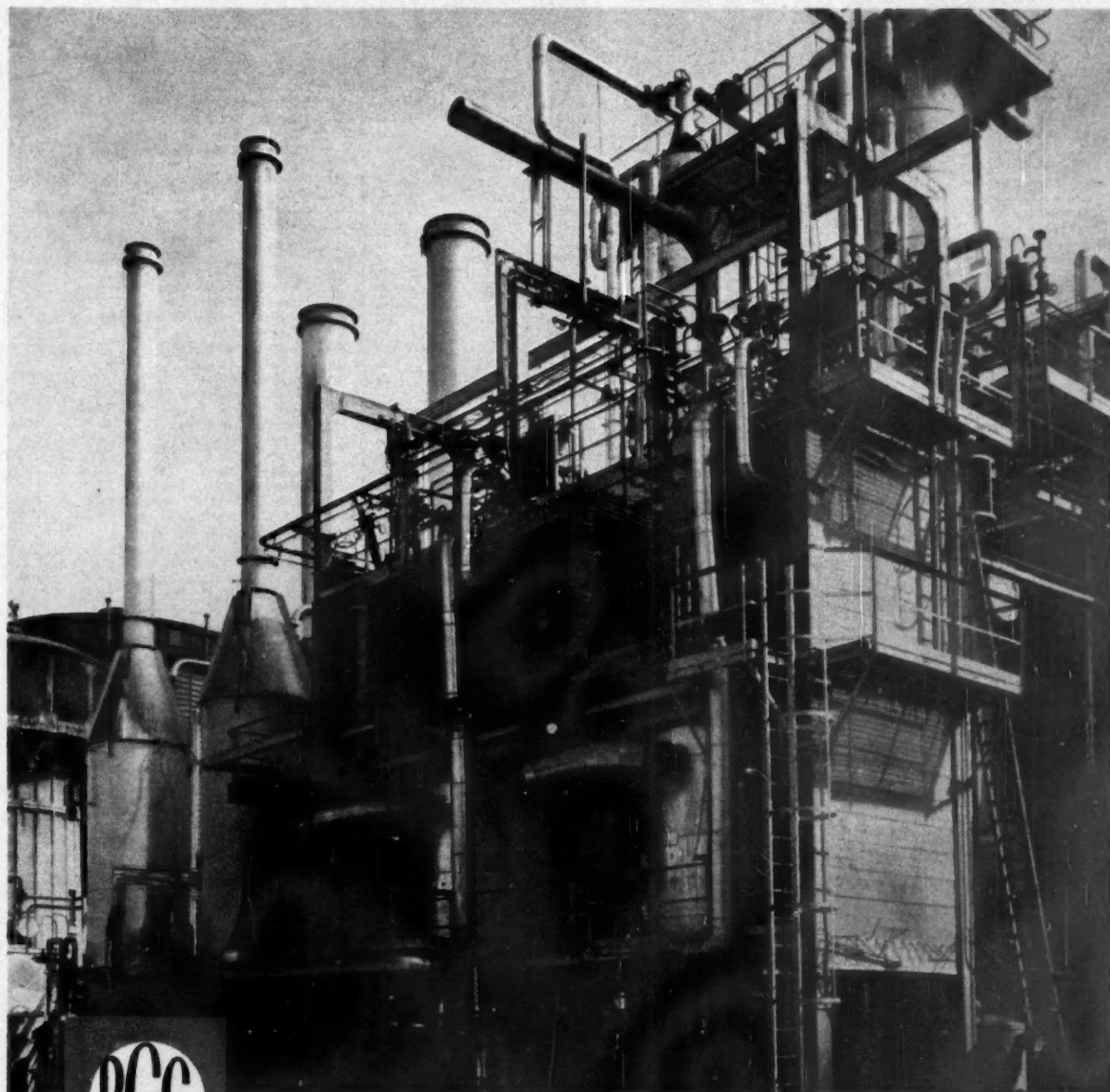


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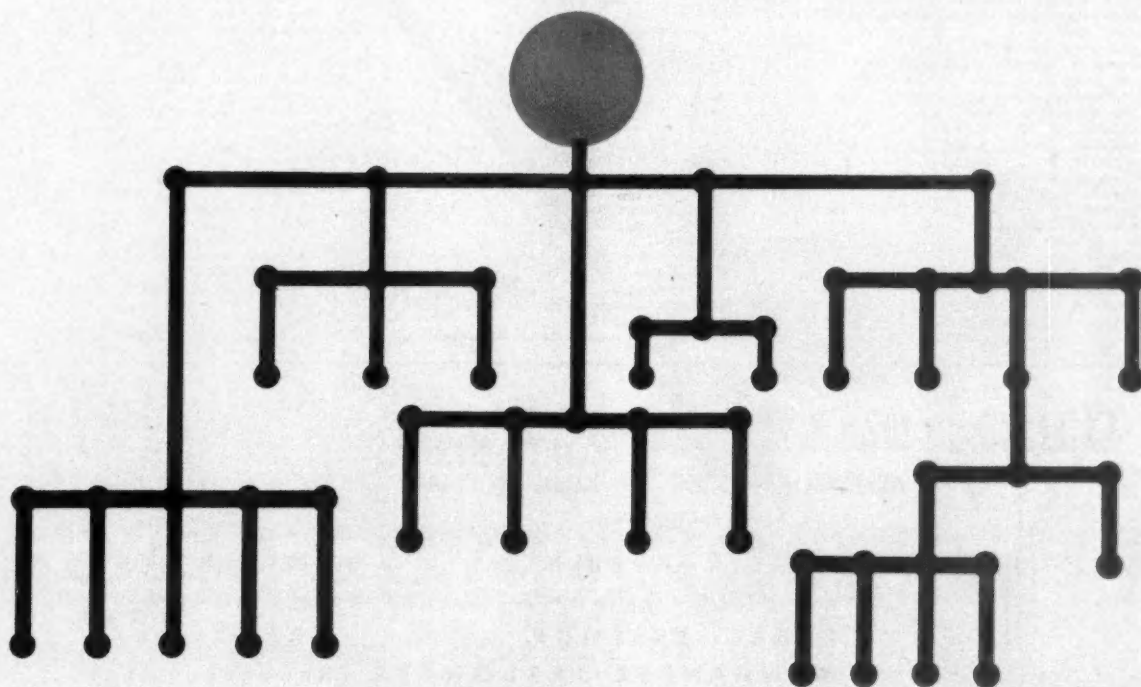
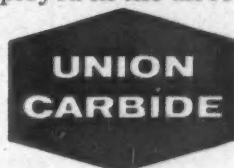
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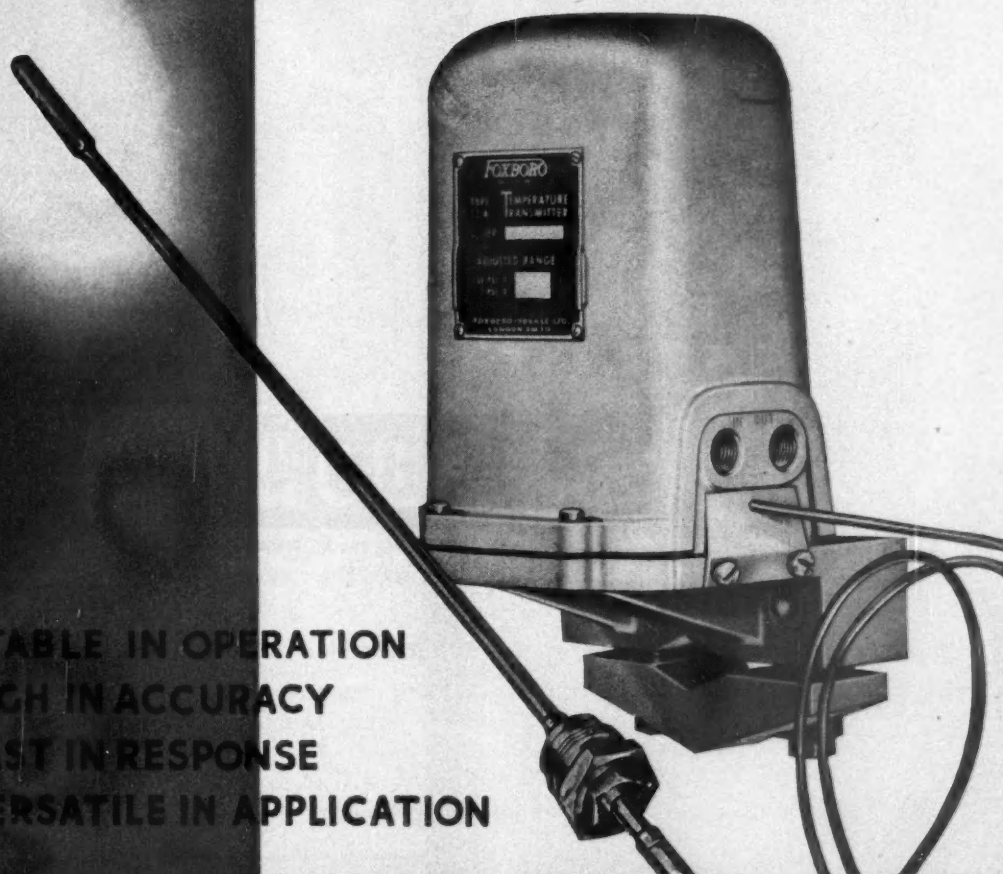
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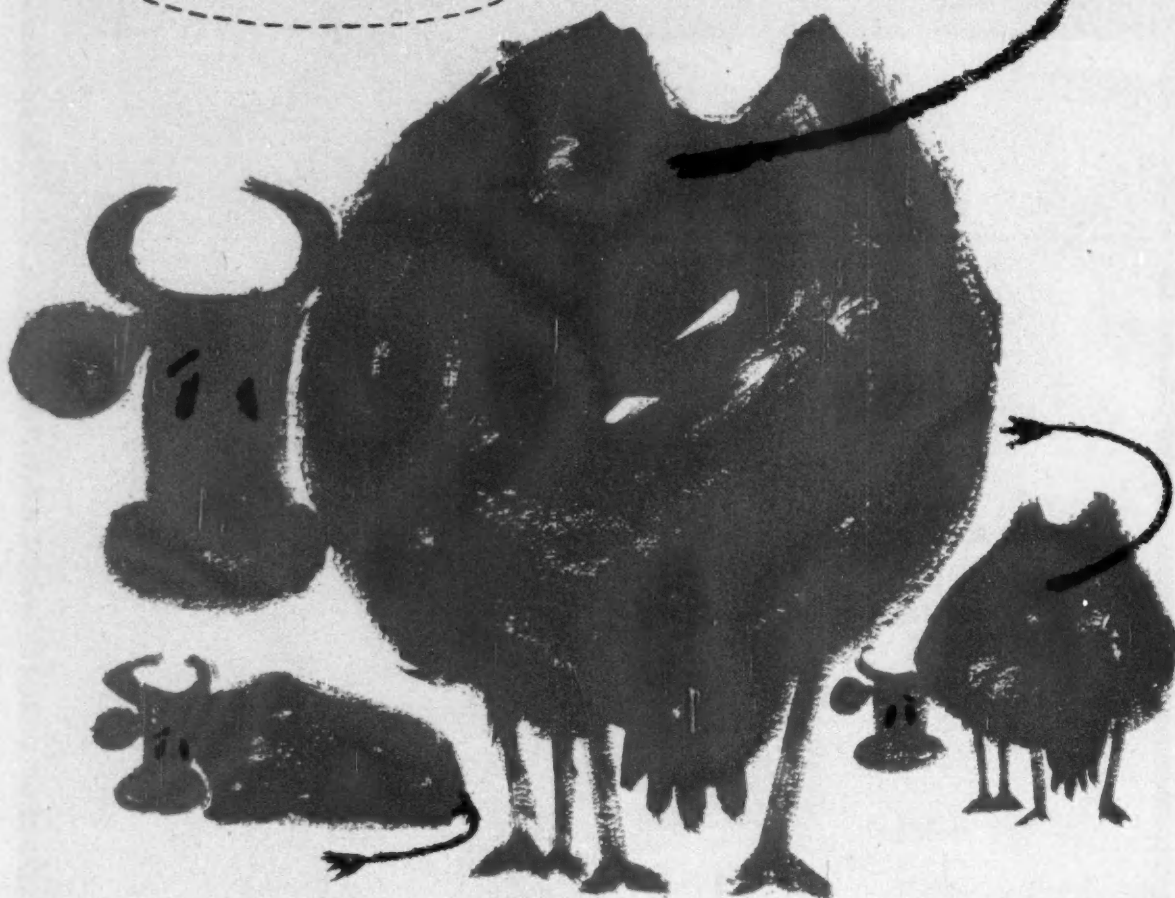
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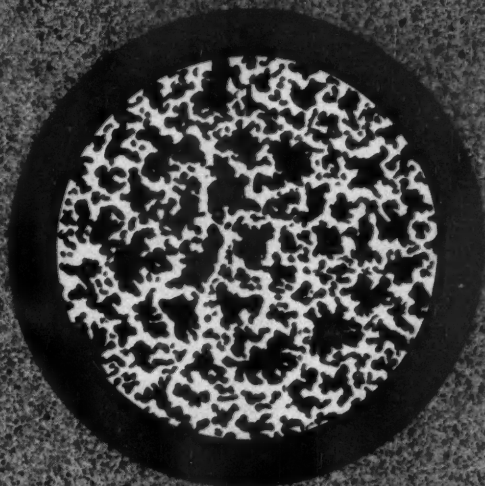
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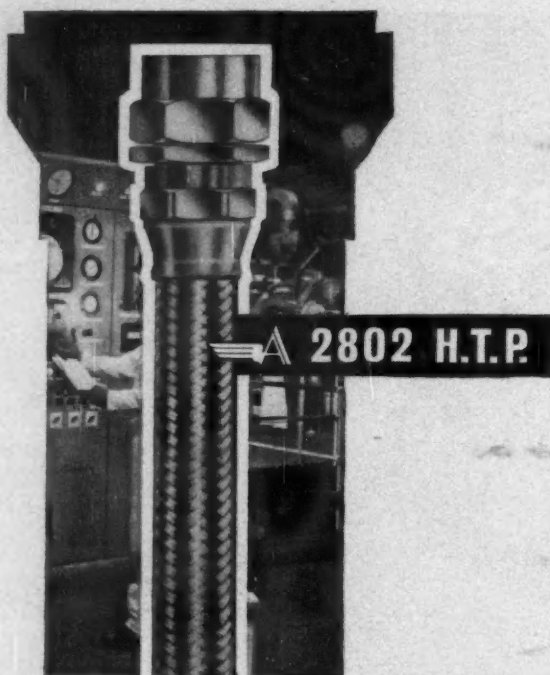
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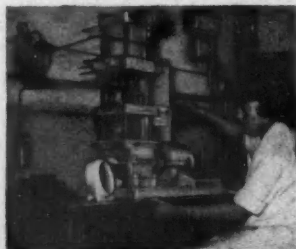
Here is a flexible hose designed to withstand the most stringent demands of modern science. An inner lining of P.T.F.E.\* extrusion combined with an outer covering of stainless steel wire braid ensures that Aeroquip 2802 has complete inertness to acids and most other chemicals, as well as being unaffected by fuels, oils and alcohols. Ideal for conditions where high pressures and high temperatures prevail and where long life is essential.

\*Polytetrafluoroethylene.

Descriptive literature showing sizes and working pressures is available on request to our Publicity Dept., Birmingham, whilst our Technical Sales Staff at Redditch will gladly advise on specific application problems.



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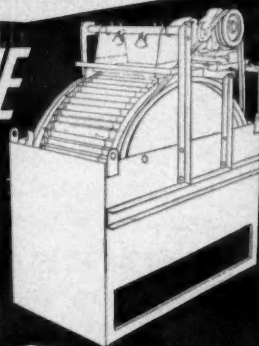
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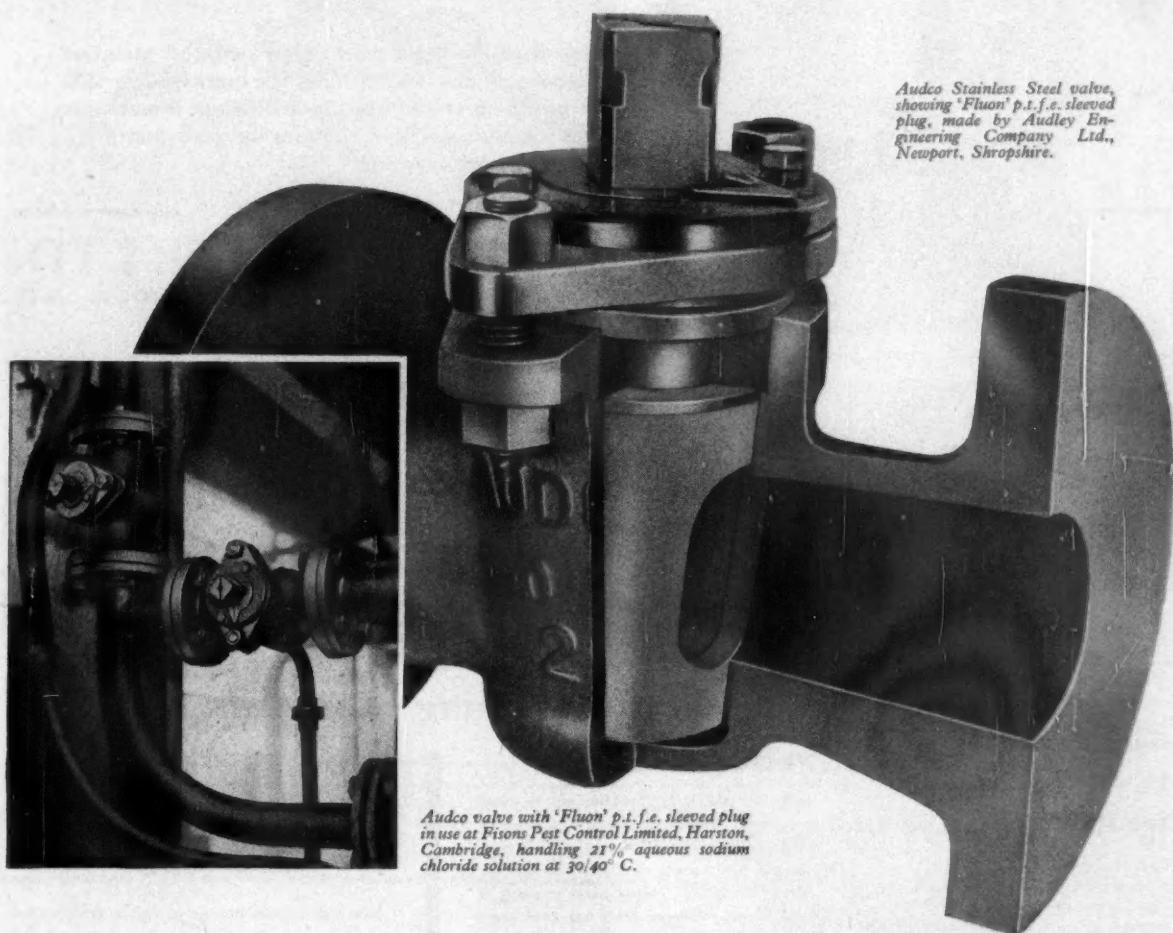
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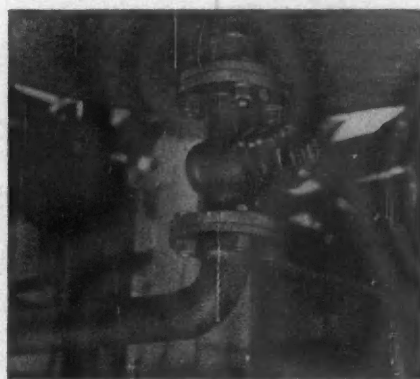
*Audco Stainless Steel valve, showing 'Fluon' p.t.f.e. sleeved plug, made by Audley Engineering Company Ltd., Newport, Shropshire.*

*Audco valve with 'Fluon' p.t.f.e. sleeved plug in use at Fisons Pest Control Limited, Harston, Cambridge, handling 21% aqueous sodium chloride solution at 30/40° C.*

## Valves with 'Fluon' sleeved plugs handle any chemical without sticking or leaking and need no lubrication

THIS valve, made by Audley Engineering Company Ltd., can handle virtually any chemical at pressures up to 150 p.s.i. and temperatures up to 100° C. It requires a remarkably low turning effort, won't stick or gall, and never needs lubrication or any other maintenance. Its secret is that its plug has a thin sleeve of 'Fluon' p.t.f.e. compounded with a suitable inert filler for dimensional stability.

This is only one out of hundreds of products that benefit from the remarkable properties of 'Fluon'. 'Fluon' is an I.C.I. plastic material which is immune to virtually all forms of chemical attack. It has a working temperature from +250° C. down to at least liquid nitrogen temperatures, the best dielectric properties and the lowest coefficients of friction of any solid. It is also both tough and flexible.

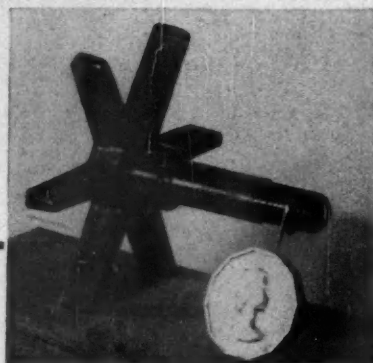


*Audco valves with 'Fluon' p.t.f.e. sleeved plugs in use at Fisons Pest Control Limited, Harston, Cambridge, handling chlorinated solvent containing 1% anhydrous HCl. at 95° C.*

**'FLUON'**

*'Fluon' is the registered trade mark for polytetrafluoroethylene manufactured by I.C.I.*

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Nylon is resistant to all alkalis, also to some mild acids. The natural resistance of Nylon to alkalis and its exceptional hard wearing characteristics have made it increasingly popular for industrial clothing. Where heavy splashing is encountered, however, there has been some seepage through the weave on to the wearer's clothing, but this has now been overcome by a new method of proofing which not only increases the alkali resistance, but also makes it completely impervious to liquids, even under pressure.

### PROOFED TERYLENE

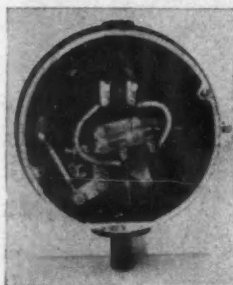
Terylene is resistant to most commercial acids and, again the special proofing prevents any liquids passing through it.

Not only against corrosive liquids are proofed nylon and terylene most useful, they are also admirable for those on outside work in bad weather, particularly where bulky clothing is inconvenient or unsafe.

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9-Anthracene aldehyde  
Arachyl alcohol 99%  
Behenic Acid  
Behenyl alcohol 90%  
Behenyl alcohol 98%  
Benzyl ethyl carbinol  
Benzyl iodide  
Benzyl isothiocyanate  
Benzyl mercaptan  
Bornyl benzoate  
2-Bromoheptane  
3-Bromoheptane  
4-Bromoheptane  
p-Bromophenacyl bromide  
1-Bromo-3-propanol  
Butadiene sulphone  
Butane-2-diol-1,4  
Calcium galactonate  
Calcium glucoheptanate  
Calcium glycerate  
Capronitrile 99%  
Caprylnitrile 99%  
Carbazole (very pure)  
Cephalin (ex-Hog's Brain) pure  
Cerium salicylate  
ortho-Chlorobenzyl chloride  
6-Chloro-hexanol-1  
3-Chloro-propanol-1  
2-Chloro-pyridine  
Colchicine USP XIV  
Copper guaiacol sulphonate  
Cupric dibenzene sulphonate hexahydrate  
Cyclodecanone semicarbazone  
Cyclododecane  
Cyclododecanol  
Cycloheptane  
Cycloheptanol  
Cycloheptanone  
Cycloheptylamine  
Cyclohexane-1,4-bis-carbinol  
Cyclohexyl urea  
Cyclooctanol  
Cyclooctanone  
Cyclooctanone isoxime  
Cyclooctylamine  
Cyclopentyl urea  
Cyclopentylamine  
Decahydrocinnamic aldehyde  
Decahydro-beta-naphthyl acetate  
beta-Decalol (cis/trans mixed)  
Decamethylene-1,10-dicarboxylic acid  
Decamethylenedinitrile  
n-Decane 99% (Olefin free)  
Decanediol-1,10  
1-Decene 95%  
n-Decylamine 99%  
Diaminododecane-1,10  
Diaminododecane-1,12  
Diaminoheptane-1,7  
Diaminononane-1,9  
Diaminooctane-1,8  
Diaminoundecane-1,11  
1,4-Dibromobutene-2  
Dibromodecane-1,10  
Dibromohexane-1,6  
Dibromononane-1,9  
Dibromooctane-1,8  
Dibromopentane-1,5  
Dichlorodecane-1,10  
Dichlorohexane-1,6  
2,3-Dichloro-1,4-naphthoquinone  
Dichloropentane-1,5  
Dicyclopentadienyliron  
Dicyclopentylamine  
Diethanolamine salt of maleic hydrazide  
Di-n-decylamine  
Di-n-dodecylamine  
Didymyl salicylate  
N-Diethyl amino acetonitrile  
asym-Diethyl ethylenediamine  
Diethyl suberate  
\*1,5-Dihydroxy naphthalene  
\*2,7-Dihydroxy naphthalene  
2,3-Dimercaptopropanol  
2,2-Dimethyl-diaminopentane-1,5

s,a-Dimethylglutaric acid  
Dimethyl-methylsuccinate  
2,7-Dimethyl-2,7-octanediol  
2,4-Dimethyl-3-pentanol (Di-isopropylcarbinol)  
3,3-Dimethylpiperidine  
2,5-Dimethylpyrrola  
2,4-Dimethyl resorcinol  
2,5-Dimethyltetrahydrofuran (water free)  
Dimethyl thapsate  
Di-n-octylamine 99%  
Di-iso-octylamine  
n-Docosane 95%  
1-Docosane 95%  
Dodecahydro-beta-naphthyl acetate  
n-Dodecane 99% (Olefin free)  
1-Dodecene 95%  
n-Dodecylamine 99%  
2,2-Diphenylethylamine-1  
n-Eicosane 95%  
1-Eicosene 95%  
1,2-Ethanedithiol  
4-Ethoxy-3-methoxy benzaldehyde  
2-Ethyl-1-butene 95%  
Ethyl-4-chloro-2-methylphenoxy acetate  
6-Ethyldecane-3  
(Ethyl-(3-ethyl)-heptylcarbinol)  
5-Ethylheptanol-2  
(Methyl-(3-ethyl)-pentylcarbinol)  
2-Ethyl-1-hexane 95%  
5-Ethynonanol-2  
(Methyl-(3-ethyl)-heptylcarbinol)  
6-Ethyldecane-3  
(Ethyl-(3-ethyl)-pentylcarbinol)  
Eugenyl methyl ether  
Ferric tartrate pure  
Furfuryl acetate  
Furoic acid 98% & 99.8%  
Glyceryl-para-aminobenzoate  
n-Heptadecylamine pure  
Heptamethylenedinitrile  
2,2,4,4,6,6,6-Heptamethylnonane 95%  
n-Heptane 99% (Olefin free)  
n-Heptanol-2 (Methyl pentylcarbinol)  
Heptanol-3  
Heptanol-4 (Di-n-propylcarbinol)  
1-Heptene 95%  
n-Heptylamine 99%  
n-Hexadecane 99% (Olefin free)  
1-Hexadecene 95%  
n-Hexadecylamine 99%  
Hexahydrobenzaldehyde  
Hexahydrobenzyl alcohol  
(Cyclohexane methanol)  
Hexahydro-p-xylidiamine  
Hexamethylenedinitrile  
Hexamethylene-imine  
3-Hexamethylene-imino-propionitrile  
3-Hexamethylene-imino-propylamine  
n-Hexane 99% (Olefin free)  
Hexanediol-1,6  
Hexanediol-2,5  
Hexanol-2 (Methyl-n-butylcarbinol)  
Hexanol-3 (Ethyl-propylcarbinol)  
1-Hexene 75%  
Hexylcinnamic aldehyde  
1-Hexyne  
2-Hexyne  
3-Hexyne  
Lanthanum salicylate  
Lauronitrile (n-Undecylcyanide)  
beta-Mercaptoethylamine HCl;  
Mercury acetamide  
Mercuric succinimide  
5-Methoxy-1-chloropentene-2  
5-Methoxy-3-chloropentene-1  
6-Methylcoumarin  
3-Methylcyclopentenediol-1,2  
3-Methylcyclopentenedione-1,2  
Methyl cyclopentylamine  
3-Methyl-5-ethyl-heptanediol-2,4  
3-Methyl-5-ethyl-nonanediol-2,4  
2-Methyl-7-ethynonanol-4  
(Isobutyl-(3-ethyl)-pentylcarbinol)  
3-Methylheptane 95%  
3-Methylheptanediol-2,4  
3-Methylheptanol-2  
(Methyl-(1-methyl)-pentylcarbinol)  
3-Methylheptanol-5  
2-Methylpentanediol-1,3  
3-Methylpentanediol-2,4

3-Methylpentanol-2  
(Methyl-(1-methyl)-propylcarbinol)  
2-Methyl-1-pentene 95%  
4-Methyl-2-pentene 95% (mostly trans)  
Methylsuccinic acid  
\*3-Methyl thiophene  
Methyltubercate  
Myristonitrile 99% (n-Tridecylcyanide)  
Nitrocyclohexane  
5-Nitro-2-furfuraldehyde diacetate  
5-Nitrofurfurylidene diacetate  
o-Nitrophenylacetic acid m.p. 138°C  
Nonamethylenedinitrile  
Nonanediol-1,9  
5-Nonanol (Di-butylcarbinol)  
n-Nonylamine 99%  
n-Nonylcyanide 99%  
n-Octadecane 99% (Olefin free)  
1-Octadecene 95%  
n-Octadecylamine 99%  
Octamethylenedinitrile  
Octamethylene-imine  
n-Octane 99% (Olefin free)  
iso-Octanoic acid  
1-Octene 95%  
2-Octene 95%  
1,8-Octolactam  
n-Octylamine 99%  
iso-Octylamine  
Palmitonitrile 99% (n-Pentadecylcyanide)  
Pentadecane (craces Tetradecane)  
n-Pentadecylamine pure  
n-Pentadecylamine 99%  
Pentamethylenedinitrile  
Pentanol-3 (Diethylcarbinol)  
2-Pentene  
Phenanthrene-9-aldehyde  
2-Phenylamino-pyridine  
(2-Anilino-pyridine)  
1-Phenylbutanol-2  
beta-Phenylethyl iodide  
beta-Phenylethyl isocyanate  
beta-Phenylethyl isothiocyanate  
Phenyl isopropyl aldehyde  
3-Phenylpropylamine-1  
bis gamma Phenylpropylethylamine Base  
bis gamma Phenylpropylethylamine dihydrogen  
citrate  
3-Piperidino-propionitrile  
3-Piperidino-propylamine-1  
Potassium croceate sulphonate  
1,3-Propanedithiol  
3-Pyrrolidino-propionitrile  
3-Pyrrolidino-propylamine-1  
Resorcinol diethyl ether  
Salicylhydroxamic acid  
Salicylhydrazide  
Sebacyl dichloride COCl(CH<sub>2</sub>)<sub>2</sub>COCl  
Serotonin creatinine sulphate  
Sodium dichloroacetic acid  
Sodium phytate  
Sphingomyelin (ex cerebro)  
Stearonitrile 99% (n-Heptadecylcyanide)  
trans-Scilbene  
Suberic acid  
Terephthalaldehyde  
Terpineol iodide  
Terpineol saponate  
Terpineol isothiocyanate  
n-Tetradecane 99% (Olefin free)  
1-Tetradecene 95%  
n-Tetradecylamine 99%  
Tetrahydrofurfuryl salicylate  
Tetrahydropyran  
Theophylline-7-acetic acid  
Thioacetamide  
Thiosilicic acid m.p. 160°C +  
Triamyl citrate  
Trichlorodimethylphenylcarbinol acetate redist:  
Trichlorohexahydro-beta-naphthol  
n-Tridecylamine 99%  
Trimellitic anhydride  
2,6,8-Trimethyl-4-nonanol  
Tri-n-octylamine 90/95% & 99%  
Tri-iso-octylamine  
di-Tryptophane pharmaceutical  
L-Tyrosine  
2-Undecanol (Methylnonylcarbinol)  
6-Undecanol (Di-amylcarbinol)  
n-Undecylamine 99%  
Variamine Blue Indicator

# Delanium GRAPHITE

## BURSTING DISCS

### LOW AND MEDIUM PRESSURES

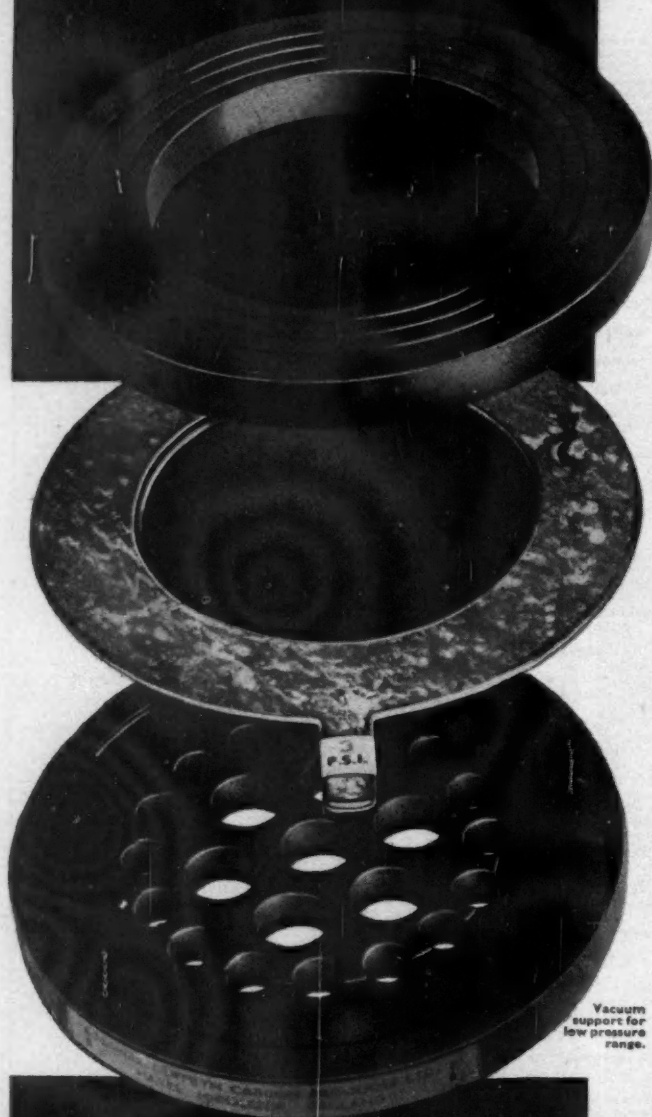
"Delanium" Graphite Bursting Discs are manufactured in two ranges, a LOW PRESSURE range covering pressures from 1-4 psig, and a MEDIUM PRESSURE range covering 5-400 psig, with orifice diameters of 2 in.-12 in. and 1 in.-12 in. respectively.

"Delanium" bursting disc assemblies are completely resistant to the corrosive attack of most acids, alkalis and solvents at temperatures up to 160°C. Manufactured from a high-quality graphite, the discs are precision ground to close tolerances and subjected to rigorous permeability and bursting-pressure tests to ensure accuracy of burst. The discs will withstand thousands of pressure applications at 75% of stated burst pressure without loss of accuracy. The design of the discs and vacuum supports assures ample relief opening on rupture for the rapid escape of excess pressures.

Replacement discs are quick and easy to install and for standard pressures are readily available from stock. Holders and vacuum supports costs are generally initial costs only and replacement discs are inexpensive.

RANGE OF DISCS AND PRESSURES	
Orifice Diameter	Bursting Pressure psig
1 in.	20-400
2 in.	4-200
3 in.	3-150
4 in.	2-100
6 in.	1-75
8 in.	1-40
10 in.	1-30
12 in.*	1-25

\* Larger diameter discs on application.



Vacuum support for low pressure range.

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R. C. BENNETT

Director N. B. LIVINGSTONE WALLACE

**Midland Office**Daimler House, Paradise Street,  
Birmingham. [Midland 0784-5]**Leeds Office**Permanent House, The Headrow,  
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# CHEMICAL AGE

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## GROWING INTEREST IN FUMARIC ACID

THE past month or so has seen the U.K. shortage of maleic anhydride completely overcome, with the bringing on stream of two new plants. That of Monsanto Chemicals Ltd. at Newport, Mon, has added 15 million lb./year to the company's existing capacity, thus trebling it. Alchemy Ltd. have recently come on stream at Belvedere, Kent, with a maleic plant of undisclosed capacity, but probably smaller.

Monsanto's plant alone is believed to be capable of meeting all foreseeable U.K. requirements for maleic and of providing a surplus for export. Fourth in importance as an outlet for maleic—and coming after resin (particularly polyesters) applications, agricultural chemicals (maleic hydrazide) and wetting agents (succinic anhydride)—is fumaric acid (obtained by heating maleic anhydride with water under pressure in the presence of a catalyst).

Fumaric is now the centre of interest, with Monsanto on Tuesday announcing plans to enter this field. Not officially announced is Alchemy's intention to come on stream with a fumaric unit at Belvedere; no capacity figures are available but it is thought that the total might be around 6 million lb./year, with Monsanto accounting for about 5 million of that.

The Alchemy plant is being engineered by Petrocarbon Developments, who handled their maleic plant. Monsanto's maleic plant was built under a Scientific Design licence, as presumably will be their fumaric unit. S.D. are the world's major company for designing and setting up maleic anhydride plants having more than 10 units either in operation, under construction or projected. These will account for more than 150 million lb./year, or over half the world's capacity.

Last year, Scientific Design announced a new fumaric acid process that upgrades maleic scrubber solutions; it can also be used for straight fumaric acid production from prime feedstock, including benzene and butenes via oxidation. Using a special catalyst and based on moderate isomerisation conditions, the process can upgrade maleic scrubber solution, and maleic refiner bottoms.

The process is simple and leads to high yields, the fumaric acid product meeting commercial specifications. The process can be adapted to plants with a fumaric capacity as small as 2 million lb./year.

Reason for the upsurge of interest both in fumaric and maleic is undoubtedly the big growth rate in U.K. production of polyester resins—up some 40% in 1960 from the 1959 level of 6,700 tons to 9,300 tons. Other outlets for fumaric acid are in alkyd resins (output static at about 45,000 tons); rosin esters and adducts for furniture lacquers and quick-setting printing inks; for upgrading natural drying oils, particularly tall oil, to improve drying characteristics; and in the pure form to replace citric and tartaric acids in foodstuffs. Other applications are as a mordant and for organic syntheses.

## U.S.S.R. to Buy Plant for Polypropylene, Isocyanates and Phosphorus in West Germany

NEWLY published quota lists under the West German-U.S.S.R. three-year agreement show a departure from usual Soviet practice in contracting for complete chemical plants. In the past this has been by individual negotiation on the part of the Soviet trade authorities and individual Western companies. Now, however, the quota lists specify the import from West Germany of complete installations for a number of important chemical products.

It is believed that U.S.S.R. trade delegations have already satisfied themselves that the West German companies concerned—which are not named in the quota lists—will be able to meet the rigid conditions on price, delivery and specifications.

This follows the pattern of the Italian-Soviet agreement, under which complete chemical plants are specified—including acetylene, ethylene and ammonia. In the case of both agreements, Germany and Italy will take large quantities of Soviet coal chemicals.

### Soviet 'Shopping List'

During the period 1961-1963, West Germany will supply the U.S.S.R. with the following:

Complete works installations for the production of polypropylene.

Complete installation for the production of di-isocyanates.

Complete installation for the production of phosphorus.

Four complete units for the crystallisation of sodium sulphate.

Complete unit for hydraulic benzene refining.

Complete installation for the production of simazine and atrazine.

Two complete installations for the production of Viniplast foil.

A number of main contracting firms are likely to be involved, as are chemical producers for the supply of know-how. Knapsack-Greishem are a possibility for phosphorus, and Bayer are the only West German isocyanate producers.

These projects are valued at DM335 million (£29.8 million), by far the biggest item on the Soviet import list. The U.S.S.R. will also import chemical products to the value of DM73 million.

The chemical plant imports quota list only covers goods originating in and coming from the Federal Republic; goods acquired from other sources will be taken against quotas only by agreement between the competent authorities in both countries.

During the same period, West Germany will import a wide range of items from the Soviet Union, including chemical products worth DM15 million; 80,000 tonnes of benzole; 33,000 tonnes of coal tar pitch; 660,000 tonnes (possibly more)

of apatite concentrate; 7,500 tonnes of turpentine; and sulphur—to a quantity or value to be decided.

Under the agreement with Italy, the U.S.S.R. will contract for the following complete chemical plants: for the production of acetylene and ethylene from natural gas; titanium oxide; maleic anhydride, ammonia; two installations for caprolactam.

In addition, the U.S.S.R. will take Lire 350 million worth of various chemicals; 5,000 tonnes of plastics materials and synthetic resins; 12,500 tonnes of synthetic rubber; Lire 340 million worth of essential oils; 3,500 to 4,000 tonnes of man-made fibres; and Lire 200 million worth of pharmaceuticals and plant for the Soviet drug industry.

Italy's imports from the U.S.S.R. will include 4 million tonnes of crude oil; 700,000 tonnes of fuel oil; 3,000 tonnes of paraffin; 30,000 tons of chromium ore; 60,000 tonnes of pyrites; 5,000 tonnes of ilmenite; 30,000 tonnes of benzole; 20,000 tonnes of toluol; 10,000 tonnes of naphthalene; 150 tonnes of pyridine; 25,000 tonnes of potassium salts; 40,000 tonnes of concentrated apatite; 100 tonnes of aniline oils; and 4,000 tonnes of turpentine.

## B.B.H. to Expand Chemical Interests by Acquiring Burts and Harvey

TO expand their chemical production activities and to consolidate tar distillation interests, Burt Boulton and Haywood Ltd., who already own 50% of the share capital of Burts and Harvey Ltd., are on 30 March acquiring the other 50% now held by private interests.

The privately held shares are valued at £487,500 and the purchase consideration at this figure will be covered by £53,188 cash and the issue of 25,000 £1 7% preference and 185,000 £1 ordinary shares in Burt Boulton and Haywood.

South Western Tar Distillers Ltd., a

## Gas Council Chairman Visits Algerian Natural Gas Field

CHAIRMAN of the Gas Council, Sir Henry Jones, returned to London on Tuesday after visiting Algeria to view the Hassi R'Mel natural gas field. Sir Henry was accompanied by Mr. W. K. Hutchison, deputy chairman of the council, Mr. Michael Milne-Watson, chairman, North Thames Gas Board, and representatives of Conch International Methane Ltd.

As stated in CHEMICAL AGE, 25 February, p. 320, and 4 March, p. 355, negotiations relating to the terms on which gas would be supplied to the U.K. are still being negotiated. It is believed that when signed the contract will stipulate some 1,000 million cu. m. of natural gas a year.

Purpose of the visit to Algeria was to obtain information needed for the Gas Council's plans to import liquid natural gas to the U.K., which it is hoped soon to submit to the Minister of Power.

## I.C.I. Polyester Fibre Rights for Brazilian Firm

Exclusive patent rights for the production in Brazil of polyester fibre have been granted by I.C.I. to the Brazilian subsidiary of Société Rhodiacéta, France, Companhia Brasileira Rhodiacéta. The fibre is produced in the U.K. by I.C.I. under the trade name Terylene and in France by Rhodiacéta under the name Tergal.

Burts and Harvey subsidiary, in whom Burt Boulton are already shareholders, recently completed a 3,000-4,000 tons/year phthalic anhydride plant at Totton Works, Southampton. Costing some £400,000, this plant was constructed by the company in conjunction with Saint-Gobain, Paris. Alchemy Ltd., the Burt Boulton subsidiary, recently came into production with a medium-sized plant at Belvedere, Kent, for the production of maleic anhydride. Contractors were Petrocarbon Developments Ltd.

## Toxic Substances in Factory Atmospheres

AN amendment to the list of permissible concentrations of toxic substances in factory atmospheres has been published by the Ministry of Labour. The original list appeared in a safety, health and welfare booklet issued by the Ministry last year, 'Toxic substances in factory atmospheres'. A copy of the amendment will be sent to anyone who wishes to receive one, after buying the booklet.

The maximum permissible concentrations given in the booklet are based on

the levels formulated by the American Conference of Governmental Industrial Hygienists, and the amendment brings the figures up to date. These levels, however, should not be regarded as fine lines between safe and dangerous concentrations. They are designed to be used as guides in the control of health hazards, and continuing attention is necessary to ensure that the atmospheric concentration in the factory is kept as low as practicable.

## Project News

# I.C.I. Polypropylene Extension Contract Awarded to C.J.B.

**C**ONTRACT for expansion of I.C.I. **Plastics Division's** polypropylene plant at Wilton has been awarded to **Constructors John Brown Ltd.**, who built the initial unit. The contract was signed recently and an announcement will probably be made next week.

When the first plant came on stream at the end of last year, it was stated that first-stage expansion plans were in hand for a rapid doubling of capacity. (C.A., 3 December, p. 942). The existing plant, built at a cost of £3 million, has a capacity of 11,000 tons/year of propylene.

The project was completed in a record time—17 months after work started on the site. In a special report (C.A., 10 December, p. 989), the reasons for this construction record were given; mainly it was due to teamwork between C.J.B. and I.C.I. engineers.

## Third Tonnox Plant for Spencer Steelworks

● A **THIRD** 200 tons/day oxygen plant for the new Spencer Steelworks of Richard Thomas and Baldwins, near Newport, Mon., is to be built by the **British Oxygen Co. Ltd.** The first two plants are due on stream by the end of this year; the latest will boost B.O.C. capacity at the works to 600 tons/day high-purity oxygen.

As well as piping oxygen to three 100-ton L.D. converters, B.O.C. will supply large quantities of a high-purity nitrogen-hydrogen mixture to the annealing furnaces.

By 1963, British Oxygen will have capacity in South Wales and Monmouthshire of nearly 2,000 tons/day, more than half the total for the whole U.K. steel industry. The Spencer Works will early next year be the world's first steelworks to be based exclusively on the Linz-Donawitz (L.D.) oxygen process.

## Kaldo Oxygen-blown Steel Plant for Davy and United

● **DAVY AND UNITED ENGINEERING CO. LTD.**, a member of the Davy-Ashmore Group, have received an order from **Shelton Iron and Steel Ltd.** for the design, supply and installation of oxygen-blown Kaldo furnace plant at their Etruria works, Stoke-on-Trent.

The contract is valued at approximately £1 million. Davy and United Engineering will also be responsible for the overall engineering of the whole of this project, which will comprise the first complete steel melting shop in the U.K. to use only Kaldo furnaces. These furnaces will have a capacity of 55 tons of liquid steel at each charge.

In announcing the order, Davy and

United Engineering point out that they are the only U.K. company offering Kaldo furnaces of wholly British design and manufacture, and that this order therefore marks an important step forward in the field of British plant supplies for oxygen steel making processes.

The engineering layout and design of the plant will be undertaken by the steel processes division of Davy and United. A substantial proportion of the contract will be manufactured in the Stockton works of the Davy-Ashmore Group.

## Boby De-aeration Plant for Monsanto

● AN £18,000 contract has been awarded to William Boby and Co., water treatment engineers, of Rickmansworth, Hertfordshire, by **Monsanto Chemicals Ltd.** It is for the supply of a de-aeration plant to their Ruabon, North Wales, factory.

## B.P. Raise Aden Refinery Throughput

● **CRUDE** throughput of **British Petroleum's** Aden refinery is to be raised from 5.5 million tons to 6.8 million tons/year by the end of this year. No new processing units will be needed, higher capacity being achieved by modification and minor additions to existing units, re-allocation of tankage and modifications and additions to pipeline systems. Cost will be about £550,000.

Two Horton spheres, each of 250 tons capacity, are being built to cater for the

export in bulk of liquid petroleum gas by tanker; previously LPG has been shipped in small containers.

## Machinery for Soviet Polystyrene Plant

● **PLANT** and machinery for Russia's first factory for the production of polystyrene moulding powder, is being shipped to the U.S.S.R. by **Sterling Moulding Materials** of Stalybridge, Ches. The contract is worth £750,000. The factory, which will produce several grades of toughened polystyrene powder, will have a capacity of 10,000 tons a year.

## Styrene-Copolymers Raise Resin Capacity

● A **NEW** reactor of the horizontal type has been delivered to **Styrene Co-Polymers Ltd.** The reactor, like a similar one installed in 1955, has a capacity of 4,500 galls. Styrene Co-Polymers produce alkyl, epoxy and acrylic resins.

Styrene Co-Polymers have also announced stage III of their expansion programme. **J. Gerrard and Sons** have been awarded the contract for the extension of the drum filling point and a three story steel framed building.

## Jobling Expand Production of Pyrex Ware

**AUTOMATIC** equipment capable of producing Pyrex tubing up to 10 in. in diameter is due to come into operation early in the summer, report the James A. Jobling group of companies, Sunderland. In addition, a 20-acre site is being cleared alongside the River Wear for the construction of new factories, the first to produce electronic components.

Jobling, who began production of Pyrex laboratory flasks, beakers and test tubes in 1922 under licence from the Corning Glass Works, U.S., report steadily increasing overseas sales: last year's total sales were up 40%.

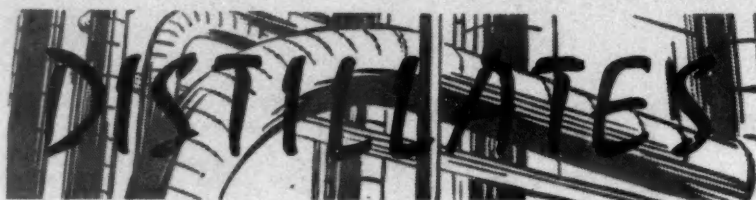
# Monsanto Plan New Fumaric Acid Plant and Extensions for Polythene, Phenacetin

**U**NDER a 1961 expansion and new construction budget of £2,540,000, **Monsanto Chemicals Ltd.** have scheduled new plant for fumaric acid, plus expansions to polythene capacity—from 17,000 tons to more than 25,000 tons/year—and further expansion of phenacetin output. The polythene expansion was announced in January ('Project News', 14 January) when it was stated that the project was the first stage of a plan to raise polythene production capacity "substantially" at Fawley.

Monsanto's U.S. parent company are already large-scale producers of fumaric acid with capacity of considerably more than 10 million lb./year. Their entry into the U.K. field will make them the third producer in this country. **Burts and Harvey Ltd.** have a four-year old plant at their Springhill Chemical Works,

Southampton, currently producing some 500,000 lb./year. **Alchemy Ltd.**, a subsidiary of Burt Boulton and Heywood Ltd., who are acquiring Burts and Harvey, already have a new maleic anhydride plant and will shortly come on stream with a fumaric plant at Belvedere, Kent. Both Alchemy units are being engineered by **Petrocarbon Developments Ltd.** Capacity figures are not given, but the maleic plant cost a reported £480,000.

Although the Monsanto entry into fumaric has been rumoured for some time, no details are being released at this stage. A further announcement, dealing both with fumaric and phenacetin, is expected early next week. Monsanto's new maleic plant—using the Scientific Design process—has a 15 million lb./year capacity, trebling their previous output. (See also p. 399).



★ WHILE a big political row brews over British pipeline plans and Government policy, other industrialised countries forge ahead with schemes for massive lines across Continents. Another case of Britain hopping-on-a-bus at the last moment.

The Trunk Pipelines scheme is a logical one that cries out for the full backing of Whitehall; but it should only be a first step in a nation-wide system of pipelines linking the major industrial centres to our ports. This is one way in which Britain can overcome a large part of the road congestion as well as making the transportation of pumpable substances a far more economic proposition. What is needed from the Government is not a policy of expediency, but one of urgency.

Not only are the Continents of Europe and North America fast being traversed by networks of pipes to convey oil, natural gas, petroleum and petroleum products, including petrochemical feedstocks, but East Europe is already claiming the world's biggest pipeline. Over 3,000 miles long with branch and sub-branch pipelines it will stretch from the Kuibyshev oilfield in the U.S.S.R. to Poland and East Germany and in the south into Hungary and Czechoslovakia. Capacity is rated at 45-47 million tons of oil a year.

★ DESCRIBED as a major 'break-through' are the new Hi-Temp Geon vinyls, said to withstand boiling water—making possible their use in domestic hot-water plumbing and in industrial hot acid piping. One-sixth the weight of copper, this piping can easily be carried to job sites or swung into position as prefabricated plumbing walls.

These high-temperature vinyls will be in commercial production by 1 May at the new Louisville, Ky., facilities of B.F. Goodrich Chemical. Until now pilot plant quantities have been produced.

★ How much whisky would it take to fill Loch Lomond? According to Lord Fleck  $5 \times 10^{12}$  bottles. Doubtless an empirical figure, but used as an example by Lord Fleck to show that it would be possible to analyse one bottle of whisky poured into the loch.

Proposing the toast of 'The Society for Analytical Chemistry' at the anniversary dinner last week, Lord Fleck described how he had taken 10 days to carry out a complete analysis on white bearing metal based on tin, cadmium, lead, bismuth and antimony. If a present-day student took longer than half a day, he would be regarded as a slow-coach and not worthy of S.A.C. membership.

Although Lord Fleck said that he had never been enthusiastic about analytical

chemistry he must have been an analyst of considerable ability. As Mr. R. C. Chirside said at the dinner, Fleck's early work on the separation of isotopes called for great skill.

★ SO FAR British chemical companies have weathered the attack on profits somewhat better than their U.S. counterparts. A good pointer is the figure for Monsanto Chemicals Ltd., whose net profit for 1960 was up 6%, on sales up 12%. The U.S. parent company could only report a sales rise of 1.8%, with profits tumbling 9.4%.

Of major U.S. companies reporting on 1960 results only four could report higher profits—Allied Chemical, Diamond Alkali, Heydon Newport and Koppers. Downturns were reported by Air Reduction, Atlas Powder, Catalin, Freeport Sulphur, Harshaw, Hercules Powder, Hooker Chemical, National Distillers, Olin Mathieson Nopco, Rohm and Haas, Stauffer and Union Carbide.

Even the biggest of them all—Du Pont—felt the squeeze (see 'Commercial News', p. 416).

★ THE possibility of glass bottles containing volatile liquids exploding is an ever present danger in many laboratories. A way of lessening the danger, however, has been suggested by Rene Droessaert, 18 rue J. Genovesi, Saint-Denis. He has invented a process by which glass bottles can be coated with a layer of p.v.c.

The bottle is dipped in a solution of vinyl chloride and vinyl acetate, dried in air for a minute and then baked at 180°C for three minutes. The layer of p.v.c. is then applied and baked for 30 minutes at 155°C. On raising the temperature to 325°C, the p.v.c. becomes transparent.

★ WHEN polyester fibres were introduced some 10 years ago, the only dyes suitable were dispersed dyes used for acetates. Because of their poor fastness and poor sublimation, these proved unsatisfactory. Shades could not be duplicated, however careful the formulation and complete affinity with the polyester fibre was not attainable.

Now, for the first time, state Koppers Co. of Pittsburgh, a new range of dyes—the Amacron dyes—are available which, it is claimed, dye in 14 colours and produce the latest shades.

Brightness, fastness to light, washing sublimation, and perspiration-fastness, are reported. With complete affinity with the fibres, rich and deep shades are possible.

★ "If you can't control it, eat it" seems to be the watchword of the Kariba Lake Coordinating Committee, who think that the weed, *Salvinia auriculata*, that is making a nuisance of itself in Lake Kariba might be turned into food of some kind, or into some other commercially saleable product. The committee have asked the Tropical Products Institute, London, for help and a Rothamsted Experimental Station (Herts) scientist has been asked to test the weed for the extraction of leaf protein as human food. Local enterprises are also investigating the use of the weed as cattle food or fertiliser.

Something will have to be done about the weed before it chokes Lake Kariba. I only hope that, turned into protein, it doesn't choke us all.

★ MUCH concern has been shown lately over the increasing number of birds poisoned by chemical seed-dressings (see CHEMICAL AGE, 4 March, p. 362), but, disturbing though the immediate effects are in this respect, there is another aspect which needs to be taken into account.

As a member of the School of Veterinary Medicine, University of Cambridge pointed out in a recent letter to *The Times*, no investigations on the really long-term effects of the newer herbicides and insecticides on man and animals have been carried out.

Although no one would dispute the immense value of these chemicals to national economy, it is true that toxicity investigations are as a rule carried out on small laboratory animals and the results of such findings do not necessarily hold good for larger animals.

The answer to such problems can only be found by more and longer-term research, of the type that will be carried out at the new Shell laboratory in Kent (see this journal, 18 February, p. 284).

★ HOLY deadlock might well describe the problem facing a young couple whose path to the altar is thwarted by Shell Chemical. According to the *Daily Telegraph* on Wednesday a 22-year-old woman trainee technologist may be asked to resign if she marries a clerk employed on the I.C.I. sales staff in Manchester.

Apparently Shell feel that such a union could lead to an embarrassing situation, but I.C.I. are quoted as saying they can see no objection as the prospective 'groom' has no special knowledge that would be of use to his fiancée's employers.

I look forward with interest to the situation that will arise when one of the 'inside information' experts on the staff of CHEMICAL AGE plights his troth to the secretary of some technical executive in the chemical industry.

*Alembic*

# NATIONAL TRUNKLINE SYSTEM TO LINK OIL TERMINAL WITH REFINERIES AND CHEMICAL PLANTS

A NATIONAL trunk pipeline system from a new deep sea terminal north of Margate through London to Birmingham and the Merseyside is planned by Trunk Pipelines Ltd., who have a Bill before Parliament for the construction of the first section—from Canvey Island to Denham with branch lines to London Airport and Fulham.

The system could serve the heavy industrial concentration in the Midlands both from the Thames and the Mersey; it could also link the oil refineries, chemical plants and storage areas on both estuaries. Comparatively short connecting spurs on either side of the route would materially increase the areas of distribution.

Trunk Pipelines say the system could serve the gas works at Romford, Wandsworth, Watford and Birmingham. Although the pipeline is planned for the transport of the lighter petroleum products and liquefied gases, it could also be used to convey other petroleum substances and other pumpable commodities. Its use to provide enrichment stock to increase the range of coal gasified at various plants and for enriching the product of the new Lurgi coal gasification plant at Coleshill is also envisaged.

## Single Steel Pipeline

On the Denham to Merseyside section, there would be a single 10 in. diameter, solid drawn and thick-walled steel pipeline with welded joints. It would be equipped with operational tankage, sectioning and routing valve stations, pumping stations and an operational control centre. Each spur is planned as a single small diameter line; the system would be fully automated.

The proposed deep-water terminal north of Margate, would have facilities for 70,000-ton to 100,000-ton tankers to discharge oil for conveyance by underwater pipeline to the Thames-side refineries of British Petroleum, Shell and Mobil, and the extension of the pipeline from London to Liverpool are not covered by the Bill. These developments will be put forward if Parliament approves the Canvey-Denham pipeline.

The terminal and pipeline system would become part of a national network of pipelines which would be available to any user. The pipeline from Denham to Birmingham and between Birmingham and Ellesmere Port would be laid the whole length on the property of British Waterways. This line is subject to the agreement of the British Transport Commission, which if granted would mean that easements would not be required. Over the whole 300 mile system from Canvey to Merseyside, only 0.61 miles would run across private land, in addition to land within the North Thames Gas Board's easement for which

landowners' permission must be obtained.

The Margate terminal and pipeline along the sea bed to Canvey Island will be prepared by Queen's Channel Terminals Ltd., who are working in association with Trunk Pipelines Ltd. It is expected that a large tanker could be discharged in 24 hours; the project would not come into operation until 1965, when the pressure for a deep-sea terminal is expected to arise.

## In Parliament

### Detoxification of Town Gas Would Cost £100 Million

GAS Council estimates that detoxification of town gas would cost about £100 million and that it would take a very long time to achieve. This was stated by Mr. J. C. George, Parliamentary Secretary, Ministry of Power, in the House recently. He added that the industry's development plans were being increasingly based on processes which will lead to gas relatively free of CO. The Gas Council has recommended all area boards to try to reduce the carbon monoxide content of gas distributed to below 10%.

The Chemico CO removal process now being installed by Chemical Construction (G.B.) Ltd. in co-operation with Whessoe Ltd. for the West Midlands Gas Board, is capable of removal down to a few p.p.m. This process was described in C.A., 5 November 1960, p. 759. The plant is due on stream this summer.

### Government Policy on Pipeline Bills

The Government has decided to introduce legislation to secure an orderly development of privately owned industrial pipelines. This was announced by

### New Glassware Works for H. J. Elliott

H. J. ELLIOTT LTD., scientific glassware manufacturers, are to open a second factory at Treforest, Glam., "in the not too distant future". This is announced in a statement issued to customers, in which the company declare that their selling prices will not undergo any change in the foreseeable future, despite yet another national wage award.

The company suffered heavy losses as a result of the floods which affected that area towards the end of last year, but say that they will not recoup these losses by raising selling prices. Elliott have held their selling prices since February 1957 when they introduced price reductions averaging 5%.

Mr. R. Wood, Minister of Power, who said that there was not time for the Bill to be brought in this session since the Government first wished to consult various interests that would be affected.

Before Parliament at the moment is the Trunk Pipelines Bill, a private Bill seeking authorisation for a trunk pipeline from Canvey Island to Denham in Bucks, as mentioned in the main article on this page.

Mr. Wood said that it would be impossible for the Government to support the Trunk Pipelines Bill because it would not be subject to the new procedure which would be applied to such projects. Government has decided against a series of private Bills. It considers national legislation to be essential but it was also made clear that it does not favour any kind of public corporation to develop pipelines.

### D.C.L. and Pension Scheme

Most of the 20,000 employees of the Distillers Company Ltd. will be contracted out of the Government's graduated pension scheme.

### Faster Transport for Fluorspar

This Leyland Octopus 240.4, here being loaded with bagged fluorspar, has been added to the fleet of Glebe Mines Ltd., Sheffield, part of the La-porte Industries Group. The lorry is fitted with a step-up auxiliary gearbox to enable it to take full advantage of the high speeds which will be possible when the Ross-Spur motorway is opened. The fluorspar is mined and processed in Derbyshire



## Monsanto Report Record Sales and Improvement in Supplies of Naphthalene for Phthalic

**R**ECORD sales by Monsanto Chemicals Ltd. totalling £20.7 million in 1960—an increase of 12%—would have been higher but for the slowing down in industrial activity in the second half of the year. This is clear from the annual statement to shareholders by Sir Miles Thomas, chairman (see also 'Commercial News', p. 416).

In 1960, rubber chemicals represented 20.8% of total sales; plastics, 22.4%; salicylates, aspirin and phenacetin, 10.6%; phthalic and maleic anhydride, and plasticisers, 10.9%; phenol and by-products, 7.8%; other chemicals, 27.5%.

Competition overseas, particularly in aspirin and salicylates, continued to intensify. Benzoates continued in high demand and an outstanding feature was the continued growth of sodium benzoate in anti-freeze. Most heavy chemicals continued in strong demand, but Monsanto were still severely hampered in the production of phthalic anhydride by the continued shortage of naphthalene. The position has already improved and Sir Miles hoped that 1960 would be the last full year in which Monsanto would have the frustrating experience of operating phthalic plants below capacity while the market remained unsatisfied.

The Ruabon phenol plant achieved a useful increase in production efficiency and sales were maintained to the limit of capacity. Sales of pentachlorophenol products again expanded, as did sales of styrene monomer.

Imposition of hire-purchase restrictions brought about a slackening in the sales of polystyrene; the new polystyrene plant brought in at the year-end to produce special grades should increase

the flexibility of their operations and strengthen their competitive position. Prospects for foamable polystyrene remained particularly bright.

There was a temporary world over-capacity in polythene, but Monsanto were confident that the manifold and steadily growing uses would redress the balance; the company is planning a major capacity increase (see page 401). Monsanto expected to improve their position in lube-oil additives as a result of research by the parent company which should improve both formulations and the range of additives.

### Monsanto U.K. Sales by Consuming Industry in 1960

	%
Plastics (inc. syn. resins) ...	35.0
Rubber ...	15.3
Drugs & pharmaceuticals ...	10.9
Paint & surface coatings ...	9.2
Ceramics & glass ...	3.1
Chemical processing ...	5.3
Petroleum (inc. oil additives) ...	3.4
Iron & steel ...	3.2
Electrical ...	2.1
Food ...	2.0
All other ...	10.5
	100.0

On research and development, Sir Miles declared that a number of projects had been taken to the design and engineering stage, while studies were made in other areas in which it would seem desirable to consolidate or expand. Market research activities were intensified.

The Australian subsidiary had introduced polyester and melamine moulding compounds, while Alta Laboratories, Bombay, in whom Monsanto have a 40% interest, were planning to expand production.

## Pfizer-Diversey Agreement on Sodium Gluconate

AN agreement has been made between Pfizer Ltd. and their subsidiary, Kembell, Bishop and Co., and Diversey (U.K.) Ltd., under which the latter will handle all sales in the U.K. of sodium gluconate and gluconic acid, when required for use in bottle-washing or aluminium etching in the U.K.

Diversey hold patents Nos. 771,791, 771,792 and 731,035 covering the use of sodium gluconate and gluconic acid in these fields. Pfizer state that they neither recognise nor contest the validity of these patents.

All enquiries relating to the two compounds should be addressed to Mr. A. Massey, assistant secretary, Diversey (U.K.) Ltd., 42/46 Weymouth Street, London W.1.

## Tour of U.S. Plastics Fair and Industry

A SPECIAL tour covering the U.S. National Plastics Exposition, New York, in June and visits to U.S. chemical and plastics companies is being arranged by London travel agents Ashton and Mitchell Travel Ltd., 55 St. James's Street, London, S.W.1.

The programme, involving flight by Pan American jet clipper, includes two days at the exhibition at the New York Coliseum and visits to Ace Plastics Co., Long Island, fabricators in polypropylene, polycarbonates, etc.; Commercial Plastics and Supply, fabricators; Buffalo laboratories of National Aniline Division of Allied Chemical; Nosco Plastics, fabricators and metallisers; Apex Reinforced Plastics, makers of high-pressure laminates; Cadillac Plastics Company, fabricators; Richardson Company, makers of laminates.

Price of the tour, which is designed for U.K. plastics industry executives, is £358 per person.

## Protein from Waste Products Sought to Aid Under-fed Areas

**F**LOUR from fish and 'milk' from vegetables are just two of the products which have been developed in an effort to overcome the acute shortage of protein in various areas of the world.

A movement has been under way for some time to bring food out of the products that man has long considered waste. Dr. Marcel Autret, Director of Nutritional Division, Food and Agricultural Organisation, revealed that some of these waste products now being processed for human consumption were the residue left after the oil has been processed from cotton seed, peanuts, sunflower or sesame seed. Pressed into cakes the residue was sold, and is still being sold, for animal feed.

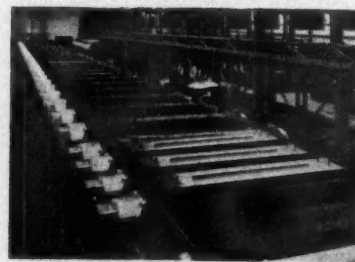
Tests showed that this waste material contains a high content of protein, and if properly processed, could provide a good source of protein for those people in areas where protein, such as milk or

meat, was too expensive or could not be produced.

Work by F.A.O. on this programme began in 1952 and now, in co-operation with W.H.O. and U.N.I.C.E.F., it has spread to all areas of the world. Among the developments are Saridele—a vegetable 'milk' produced from soyabean and sesame; a pilot plant in India producing groundnut flour; another plant in India producing vegetable 'milk'.

Although the standard protein rich foods have been developed and are more or less now waiting the sponsorship of private industry, research continues on new products. Japanese food technologists are carrying out research to find a fermented soyabean product, suitable for infant feeding, and on the use of seaweed as a protein source. In the Philippines, efforts are under way to develop a process to produce an edible defatted coconut flour.

## ELECTRO-DEPOSITION PLANT USES VINYL



Electro-deposition plant recently completed by Electro-Chemical Engineering Co., Ltd., Woking, for a leading French steel manufacturer (C.A., 28 Jan., p. 175). In the top of each tank is a slotted tray made from Cobex rigid vinyl, which is inert to chemical attack

## First Phase of F.A.O. Fertiliser Campaign Gets Under Way

FIRST two-year stage of the Food and Agricultural Organisation programme aimed at expanding and improving the use of fertilisers has become operational. The fertiliser industry, which is financing the programme, has contributed or pledged \$262,300 towards the first year's work.

A panel of fertiliser industry representatives asked the F.A.O. last July to undertake a five-year, \$2 million programme as part of its freedom-from-hunger campaign.

The aim of the programme is to stimulate the interest of governments and farmers of less-developed countries in the efficient use of fertilisers, and to provide governments with the advice and information necessary for developing national fertiliser programmes.

## New Adhesive Solves P.V.C. Bonding Problems

A NEW adhesive, CLAM 77, has been marketed by London Adhesive Co. Ltd., Arlington Works, Arlington Avenue, London N.1. Claimed to solve the problem of bonding p.v.c. materials, the adhesive is an internally plasticised copolymer in the form of a free-flowing, clear, colourless solution.

The adhesive application is a cold process in which the resin is spread over the surface and a little pressure is applied. The resin has a high initial tack and forms an excellent bond in fixing p.v.c. to itself. With cotton backed p.v.c., adhesive can be applied both to the cotton backing and the p.v.c. where overlapping is required.

## Head Wrightson Processes Join Cooling Tower Institute

FIRST British manufacturer to be elected to membership of the Cooling Tower Institute, U.S., is Head Wrightson Processes Ltd., a subsidiary of Head Wrightson and Co. Ltd. The Institute was formed over 10 years ago to advance the technology, design and performance of industrial water cooling equipment, and to conserve water as a natural resource.

In association with the Fluor Products Co. of California, U.S., Head Wrightson have for many years been concerned in a programme of research and development into improved methods of cooling and recently introduced a new range of cooling towers for small industrial duties.

## Micro- and Semi-microchemical Methods

A course of 12 lectures with appropriate practical work is to be held on Saturday mornings at Norwood Technical College from 9.15 a.m. to 12.30 p.m. on the subject of 'An introduction to micro- and semi-microchemical techniques methods'. Application forms may be obtained from the secretary of the college.

# Sir Cyril Hinshelwood Opens O.C.C.A. Technical Exhibition

IN looking at the considerable advances that had been made in paint technology in modern times, we are inclined to attribute these advances wholly to science. But it should be more widely appreciated that practical know-how plays a very important role; there is a tendency to underestimate the value of manual dexterity and practical sense.

This view was expressed by Sir Cyril Hinshelwood, O.M., D.Sc., F.R.S. (president of the Royal Society 1955-1960) at the luncheon preceding the O.C.C.A. 13th Technical Exhibition, which he opened in London on Monday, 6 March. Sir Cyril said he expressed this view in spite of the fact that he was a chemist and very much aware of the contributions of science to paint technology.

Sir Cyril was speaking as guest of honour at the luncheon and was replying to an address of welcome by Mr. P. J. Gay, B.Sc., president of the Oil and Colour Chemists' Association. The introductory speech was by Mr. J. A. L. Hawkey, chairman of the London Section of O.C.C.A.

For the first time, the exhibition luncheon was attended by the president of

the Federation of Societies for Paint Technology, U.S. This was Mr. Eugene ('Gene') Ott, who later toured the exhibition with other guests. These included Lord Fleck, president, Society of Chemical Industry; Mr. E. B. Calvert, chairman, Paint Manufacturers' Joint Executive Council; Mr. S. W. Greig, president, National Paint Federation; Mr. T. S. Dally, president, Society of British Paint Manufacturers; Mr. N. E. Ward, president, Society of British Printing Ink Manufacturers; Mr. A. K. Ames, chairman, British Colour Makers' Association; Mr. C. H. Glassey, president, British Plastics Federation; Mr. H. F. Wilson, president, The Plastics Institute; Mr. F. M. Stevenson, president, Society of Dyers and Colourists; Mr. L. R. Hickson, president, Research Association of British Paint, Colour and Varnish Manufacturers; Mr. R. M. C. Nunnely, chairman, Printing, Packaging and Allied Trades Research Association; Dr. L. Valentine, director, Research Association of British Paint, Colour and Varnish Manufacturers; and Mr. A. R. Penfold, an honorary member of O.C.C.A. and foundation chairman of the Australian Section.

## Exhibition Model Shows Features of U.C.C. Phthalic Anhydride Process

MAIN features of the fluid-bed phthalic anhydride process operated by United Coke and Chemical Co. Ltd. were illustrated by a model shown on the company's stand at the Oil and Colour Chemists' Association Technical Exhibition in London this week. The company's plant—U.C.C. were the first in Europe to build a fluid-bed phthalic plant—is now operating steadily at its designed capacity of 3,000 tons/year, using a sulphur-resistant vanadium pentoxide-type catalyst specially developed by the company.

In the process, air is compressed and passes through a surge drum before entering the reactor. Naphthalene is pumped from a storage tank and enters the reactor at the side. The reactor is fitted with internal filters to take out the catalyst. Exit gases are subjected to a preliminary cooling and are passed to a battery of condensers connected in parallel, where phthalic is removed. The remaining gas is then passed to atmosphere through a scrubbing tower to remove final traces of product. Crude phthalic anhydride is distilled under vacuum. In this process, only very small amounts of maleic anhydride are produced as by-product—not sufficient for economic recovery.

As reported in CHEMICAL AGE last week (p. 357) U.C.C.'s phthalic anhydride process has been licensed to Foster

Wheeler Ltd., London, and their New York associate company, while production of the new catalyst has been licensed to the Davison Chemical Co., Baltimore, Maryland, U.S. Foster Wheeler have already received a number of contracts for plants using the new process.

## Goodyear Develop New Polyester Family with Good Chemical Resistance

A NEW family of polyester resins with exceptional resistance to abrasion, u.v. rays, chemicals and weather, has been developed by the Goodyear Tyre and Rubber Co. Chemical Division. Other advantages claimed for the new VAPE200 resins include excellent adhesion, clarity, electrical properties and the ability to bind pigment.

Applications with the most promise are as clear, tinted or coloured coatings for metals, such as car bumpers and wheel covers. It is thought the resins will find wide use in hot melt adhesives and coatings—one of the range has been approved under the U.S. food and drug regulations for use in packaging.

Further information is available from Hubron Sales Ltd., Failsforth, Manchester, exclusive U.K. distributors for Goodyear chemicals.

# S.A.C. ANNIVERSARY DINNER



At the S.A.C. annual dinner, left to right, E. A. Hontoir (Rio Tinto Co.), C. Whalley (Laporte Chemicals Ltd.), P. Rayner (B.I.P. Chemicals Ltd.), Dr. and Mrs. J. H. Weir, and Mrs. and Dr. H. Amphlett Williams (public analyst)

## Outstanding Analytical Chemists Have Come From I.C.I. Divisions

SOME of Britain's most outstanding analytical chemists had been nurtured in the divisions of I.C.I., declared Mr. R. C. Chirside, retiring president of the Society for Analytical Chemistry, at the S.A.C. anniversary dinner held in Fishmongers' Hall, London, on 3 March. Mr. Chirside was replying to the toast of "The Society," proposed by Lord Fleck, president, Society of Chemical Industry and formerly chairman of Imperial Chemical Industries Ltd. Some 150 members and guests were present.

Mr. Chirside, who is chief chemist of the Research Laboratories of the General Electric Co. Ltd., said that at the I.C.I. Billingham had done much to pioneer the application of gas chromatography to industry. This division had also built analytical equipment into plant and by continuous monitoring had achieved a high degree of automation.

He spoke of a new concept of analytical chemistry in which physical chemistry played an increasingly important part. Analysis was now recog-

nised as a basic tool in a wide sector of industry.

Proposing the toast of 'The Society for Analytical Chemistry', Lord Fleck declared that although in his student days he was never enthusiastic about analytical chemistry he took it very seriously. He spoke of his early efforts at analysis, some of which took 10 days to complete. Now highly scientific and intricate methods had been developed which were worthy of admiration from mere administrative chemists like himself. It was now possible to work in  $10^{-4}$  p.p.m. in silicones (see also 'Distillates', p. 402).

Lord Fleck was disappointed that no U.K. chemist had published any historical work on analytical chemistry; it was not even dealt with in the 'History of Technology'.

The analytical mind was one of the most valuable things that British industry could have today—analysing causes and so arriving at decisions about the effect.

Dr. A. J. Amos, the society's new president, proposed the toast of 'The Guests', particularly welcoming Lord Fleck, Mr. E. LeQ. Herbert, president, Royal Society of Chemistry, Sir Harry Jephcott, chairman, Council for Scientific and Industrial Research—an S.A.C. member for 41 years and now a life member, Mr. O. W. Humphreys, technical director of the General Electric Co. Ltd., Sir Charles Goodeve, director, British Iron and Steel Research Association, Mr. G. L. Bailey, director, British Non-Ferrous Metals Research Association, Dr. A. T. James, chairman, Gas Chromatography Discussion Group of the Institute of Petroleum's Hydrocarbon Research Group, and Dr. J. H. Hamence, president, Association of Public Analysts and former S.A.C. president.

After Mr. Herbert had replied for the guests, Mr. Chirside formally installed Dr. Amos as president of the society; Dr. Amos then invested Mr. Chirside with a past-president's badge of office.



E. LeQ. Herbert, Royal Institute of Chemistry president, left, with Lord Fleck of Saltcoats, Society of Chemical Industry president

## Crude Coal Tar Output Nears 3 Million Tons/year

THE new monograph on Coal Tar Fuels by the technical committee of the Association of Tar Distillers was introduced by Mr. Richard Wood, Minister of Power, at a cocktail party held in London recently. Mr. Wood said that despite periods of acute scarcity and surplus since the first edition was published in August 1944, coal tar fuels had both maintained their place and given useful relief in times of special difficulty.

Production and consumption of liquid coal tar fuels are currently not far short of 1 million tons/year. Total U.K. annual output of crude coal tar, excluding that derived from low-temperature carbonisation (which only accounts for about 1.5% of total annual output) is now nearing 3 million tons. Of this high aromatic tars comprise 55% and low aromatic tars 45%. Practically the whole amount is distilled for the production of refined products, including all types of coal tar fuels.

Copies of the book are available from the A.T.D. at 9 Harley Street, London W.1, price £1 1s.

## Fully Automatic Control Pipette

A PIPETTE suitable for use with aggressive of poisonous liquids is being produced by a Dutch firm, Technische Homdelsondermering Parco of Eindhoven (Holland). The instrument consists of a vacuum chamber with associate separate pipettes of a given volume. The liquid is drawn in by a water-jet pump connected to this chamber. When the pipette overflows into the vacuum chamber, it is closed by a rubber stopper operated by a push-button. The pipette is then entirely filled and contains the exact amount of liquid to be dispensed. As the separate pipettes are not graduated and it is no longer necessary to watch the graduation mark, the work can be done quickly and accurately, even by untrained persons. The pipettes can be connected in series so that several quantities can be pipetted simultaneously.

# PETROCHEMICALS

## U.K. Heavy Organic Chemicals Industry—Plants and Producers Surveyed

AS has proved the case in other countries the U.K. organic chemical industry has tended to develop at centres where good deep-water shipping facilities are available for ease of transportation of the raw material or the final product. In many cases petrochemical plants have been built at sites of oil refineries, where plants for the pro-

duction of petrochemical feedstocks, such as ethylene, propylene or butadiene, have attracted to them satellite factories for the conversion of these feeds to the end products, like synthetic rubber, plastics and organic intermediates.

The principal sites of manufacture are located at Grangemouth in Scotland where British Hydrocarbon Chemicals and their subsidiaries are located; Billingham and Wilton on the River Tees in Yorkshire where Imperial Chemical Industries have a large complex; in the Mersey and Manchester Districts at Stanlow and Carrington where Shell Chemical

operate and also Cabot Carbon at Ellesmere Port; at Spondon in Derbyshire where the British Celanese Division of Courtaulds operates a chemicals plant; at Swansea and Llandarcy in South Wales where United Carbon are operating and British Hydrocarbon Chemicals plan a major new project; on the River Severn at Avonmouth where Philblack have a carbon black plant and Imperial Chemical Industries plan a duplicate of their vast Billingham/Wilton complex; at Shellhaven on the River Thames where Shell

*This concludes the C.A. report of the paper given by Harold P. Hodge, B.Sc., at the national meeting of the American Institute of Chemical Engineers (see also last week's 'Chemical Age', p. 359).*

(Continued on page 409)

Product	Raw Material	Process	Status	Capacity
<b>BRITISH HYDROCARBON CHEMICALS LTD., Grangemouth and Llandarcy.</b> (British Petroleum 50%/D.C.L. 50%)				
Ethylene	Naphtha	Steam cracking (Kellogg)	3 units operating	130,000
Propylene	"	"	"	110,000
Butadiene	"	Steam cracking & extraction (Esso Research)	1 unit operating	10,000
Tetrapropylene	Propylene	U.O.P. polymerisation	Expansion (1961)	to 20,000
Phenol	Benzene & propylene	Cumene	Operating	20,000
Polyethylene	Ethylene	Phillips	"	13,000
Ethanol	"	Catalytic hydration (Shell)	"	11,000
Isopropanol	Propylene	H <sub>2</sub> SO <sub>4</sub> absorption (D.C.L.)	"	60,000
Methanol	Refinery gas	—	"	30,000
Ethylene dichloride	Ethylene	—	New plant (1961)	?
Ethylene, propylene & derivatives	Naphtha	—	New \$28 million plant to duplicate much of above	?
<b>B.P. CALIFORNIA LTD., Isle of Grain, Kent</b> (British Petroleum 50%/California Chemical Co. 50%)				
Ortho-xylene	Reformed naphtha	—	New plant (1961)	9,500
Para-xylene	"	—	"	11,000
Ethyl benzene	"	—	"	8,000
<b>COURTAULDS LTD. (British Celanese Division), Spondon, Derbyshire.</b>				
Ethylene	Naphtha	Vapour phase cracking (Celanese)	1 unit operating	15,000
Propylene	"	"	Expansion (1960)	to 21,000
Ethanol, acetic acid, acetic anhydride, acetone, isopropanol, ethylene dichloride	Ethylene & propylene	Own	1 unit operating	7,000
Cellulose acetate	See above	"	Expansion (1960)	to 10,000
Vinyl acetate	"	"	Operating	To meet own requirements
Viscose rayon	"	"	"	35,000
Courtelle (polyacrylonitrile fibre)	Acrylonitrile	—	"	3,500
Benzene, toluene, xylene	Cracked naphtha	A.P.V. defronting units, plus acid wash	1 unit operating	200,000
			Expansion (1961/62)	6,000
			New plant	to 14,500
<b>ESSO PETROLEUM COMPANY LTD., Fawley, Hants.</b>				
Ethylene	Naphtha	Steam cracking (Esso Research)	1 unit operating	40,000
Heptenes	Propylene & butylene	U.O.P. polymerisation	New plant (1961/62)	Expansion
Butadiene	n-Butylene	Dehydrogenation (Esso Research-Dow)	Operating	15,000
Butyl rubber	Iso-butylene & isoprene	Extraction (Esso Research)	"	42,000
		Polymerisation (Esso Research)	New plant (1963)	30,000
<b>FORTH CHEMICALS LTD., Grangemouth and Llandarcy.</b> (B.H.C. 66⅔%/Monsanto Chemicals 33⅓%)				
Styrene	Ethylene & benzene	AlCl <sub>3</sub> alkylation (Monsanto); dehydration (Dow)	Operating	30,000
			Expansion (1960/61)	to 50,000
			New unit (1962/63)	50,000

Product	Raw Material	Process	Status	Capacity
<b>GRANGE CHEMICALS LTD., Grangemouth.</b> (B.H.C. 66½% / California Chemical 33½%)				
Dodecyl benzene	Tetramer, benzene	H.F. alkylation (California Research)	Operating	15,000
<b>IMPERIAL CHEMICAL INDUSTRIES LTD., Billingham, Heysham, Hillhouse, Wilton, Severnside</b>				
Ethylene	Naphtha	Steam cracking (Kellogg)	3 units operating Expansion	120,000 to 140,000
Propylene	"	"	3 units operating	80,000
Butadiene	"	Steam cracking & extraction (Phillips)	1 unit operating Expansion (1961?)	14,000 ?
Polyethylene	Ethylene	High pressure (I.C.I.)	Operating Expansion (1960/61)	90,000 to 105,000
Polypropylene	Propylene	Montecatini	New plant (1961)	10,000
P.v.c.	Acetylene	I.C.I.	Operating Expansion (1961)	70,000 to 80,000
Polymethyl methacrylate	Acetone	Via acetone cyanohydrin	Operating	20,000
Ethylene oxide & glycol	Ethylene	Chlorhydrin	1 unit operating	16,000
Isopropanol	Propylene	Direct oxidation (S.D.)	New unit (1962)	35,000
Acetone	Isopropanol	H <sub>2</sub> SO <sub>4</sub> absorption	Operating	40,000
		Catalytic dehydrogenation	Operating Expansion (1961)	28,000 to 36,000
Oxo alcohols	Propylene, heptenes & other olefins	Oxo plus hydrogenation	3 units operating Expansion (1961/62)	60,000 to 140,000
Methanol	Synthesis gas	High-pressure synthesis	Operating Expansion (1962)	50,000 to 95,000
Phenol	Benzene	Via chlorobenzene	Operating Expansion	15,000 to 20,000
Butadiene copolymers	Butadiene, styrene, acrylonitrile & methyl methacrylate	Emulsion polymerisation	1 unit operating New plant (1961)	10,000 ?
Acrylonitrile	Acetylene	Conventional	Operating Expansion	? to 20,000
Terephthalic acid	Mixed xylenes	I.C.I.	Operating Expansion (1960/61)	13,000 to 26,000
Nylon 66	Benzene	Du Pont	Operating	27,000
Nylon 6	Phenol	Via caprolactam	New plant	15,000
Polyester fibre (Terylene)	Terephthalic acid & ethylene glycol	I.C.I.	Operating Expansion (1960/61)	15,000 to 22,000
<b>MONSANTO CHEMICALS LTD., Newport, Ruabon and Fawley.</b>				
Dodecyl benzene	Tetramer, benzene	AlCl <sub>3</sub> alkylation	Operating	16,000
Maleic anhydride	Benzene	Vapor-phase oxidation	"	?
Phthalic anhydride	Naphthalene	Fixed bed, vapor-phase oxidation	New plant (1961)	7,000
Phenol	Benzene	Sulphonate	Operating	16,000
Polyethylene	Ethylene	High pressure	"	10,000
			Operating Expansion (1961/62)	17,000 to 26,000
Polystyrene	Styrene	Monsanto	Operating	8,000
Butadiene/Styrene copolymers	Butadiene; styrene	Emulsion polymerisation	"	4,000
<b>SHELL CHEMICAL CO. LTD., Carrington, Shellhaven, Stanlow.</b>				
Ethylene	Refinery gas	Steam cracking (Badger)	Operating	25,000
Naphtha	"	Catarole cracking	5 units operating	15,000
		Steam cracking (Kellogg)	New unit (1960/61)	55,000
Propylene	Cat. cracker gases; naphtha	Separation (Badger)	Operating	40,000
		Catarole cracking	5 units operating	10,000
		Steam cracking (Kellogg)	New unit (1960/61)	30,000
Isopropanol	Propylene	H <sub>2</sub> SO <sub>4</sub> absorption	Operating	35,000
Acetone	Isopropanol	Dehydrogenation	"	20,000
Sec.-butanol	Butylenes	H <sub>2</sub> SO <sub>4</sub> absorption	"	37,000
Ethylene oxide	Ethylene	Chlorhydrin	"	12,000
		Direct oxidation (Shell)	"	25,000
Propylene oxide	Propylene	Chlorhydrin	"	12,000
Styrene	Ethylene	AlCl <sub>3</sub> alkylation	"	18,000
	Benzene	Dehydrogenation (Dow)	"	
Dodecyl benzene	Tetramer; benzene	H.F. alkylation (Shell)	"	30,000
Dodecyl benzene (straight chain)	Cracked wax olefins; benzene	H.F. alkylation (Shell)	Operating	5,000
Polyethylene	Ethylene	High pressure (B.A.S.F.)	Expansion (1960/61)	20,000
Polyethylene & polypropylene	Ethylene & propylene	Low pressure (Ziegler)	New plant (1961)	15,000
Polydiene rubbers	Isoprene & butadiene	Polymerisation (Ziegler)	New plant (1962/63)	?
<b>UNION CARBIDE LTD., Grangemouth, Hythe</b>				
Ethylene oxide & derivatives	Ethylene	Direct oxidation (S.D.)	Operating	20,000
Polyethylene	Ethylene	High pressure (I.C.I.)	Operating Expansion (1960/61)	11,500 to 25,000

## Petrochemicals Survey

(Continued from page 407)

Chemical operate; and at Fawley in Hampshire where the Esso Petroleum Co.'s chemical raw materials plant is the centre of a group of satellite plants.

As is common elsewhere in Europe there are a large number of joint companies in existence in the chemical industry. The view that product diversification and corporate growth can be achieved in less time and at lower cost through joint companies than through self development seems to prevail. An example is British Hydrocarbon Chemicals, major petrochemicals producers, jointly owned by the British Petroleum Co. and the Distillers Company Ltd. Many companies have assured themselves of their raw material supplies or of outlets for their finished products by acquisition of suitable companies. For example, Monsanto Chemicals have a large shareholding in Forth Chemicals who supply styrene monomer for Monsanto's polystyrene. Similarly, Imperial Chemical Industries a major producer of polyethylene film owns one of the largest polyethylene film producers in Britain. The only large producer of S-type synthetic rubber in the U.K., the International Synthetic Rubber Company Ltd., is jointly owned by a consortium of all the major rubber companies in Britain.

**Exports.** Chemicals represent one of Britain's largest exports and are exceeded only by exports of motor vehicles and engineering products. Total value of all chemicals exported in 1959 was \$820 million of which exports of organic chemicals accounted for approximately \$200 million and plastics \$110 million.

As an illustration of the importance of exports to some of the branches of the organic chemicals industry a high percentage of production was exported in 1959 in the carbon black (43%), plastics (29%), synthetic detergents (24%), and tetraethyl lead anti-knock fluid (77%), industries. Even the relatively new synthetic rubber industry exported 14% of production in that year.

Increasing competition in chemicals export markets can be expected in the future but the size and dynamism of the chemical industry in the U.K. should ensure a continued share of these markets for British companies.

## Chemical Production Index Fell in December

Provisional production index for the chemicals and allied industries in December showed the usual seasonal fall to 142 points (compared with a 1954 average of 100). The figure for November was 152, that for December 1959 was 133, while the provisional 1960 figure was 145. Provisional December index for general chemicals, etc., was 141 (154 in November, 134 in December 1959 and 146 in 1960). For coke ovens, oil refineries, etc., the provisional December index was 146 (141 in November, 131 in December 1959, and 139 in 1960).

# SPECIAL EQUIPMENT USED AT I.C.I.'s NEW MELINEX PLANT



General view of I.C.I.'s Melinex Plant

THE opening of the I.C.I. Melinex plant at Dumfries on 2 March (see *CHEMICAL AGE*, 4 March, p. 361) is the culmination of many years' research which has run alongside the development of Terylene fibre.

It was quickly realised that Terylene possessed excellent film-forming properties, and a team of research workers of the Plastics Division was formed to examine the plastics applications of the polymer, but a long and costly programme of research was required before a commercially useful manufacturing process was developed.

The process exploits the unusual amorphous/crystalline structure of the polymer. Although some of the necessary equipment was basically standard, it proved inadequate for the purpose and a great deal of major design work had to be carried out. Some of the equipment was entirely designed by I.C.I. engineers.

A pilot plant for the production of Melinex was built at Welwyn Garden City in 1954, and from this valuable information was obtained for the design of a larger plant.

Dumfries was chosen as the site for the new plant, partly because it is suitable for further development but also because there existed high unemployment in the area. At present, the plant, with an annual capacity of 2,000 tons or more,

provides employment for 130 local people and the number is expected to increase by the end of the year.

Although Melinex is more expensive than the usual packaging films it differs from them radically in every property, and consequently a much wider field of application is expected. In the electrical industry its high dielectric strength and its availability in very thin gauges makes it an attractive material for small condensers, capacitors and other applications. Due to its low gas permeability, flexibility at low temperatures and good chemical resistance, Melinex has been used for lining hoses and for conveying gases, liquefied gas and corrosive chemicals.

As Melinex contains no plasticisers, it can be metallised by the vacuum process; the film metallised with aluminium is finding use in textile applications.

Melinex has a high melting point and is able to withstand normal cooking temperatures, a property which gives it a great potential as a packaging material for foodstuffs such as poultry which could be cooked in the pack.

The output of the new plant will satisfy all the immediate requirements for polyester film so making it possible to do without imports from the U.S. and Continent. There also exists a demand for Melinex in many overseas markets, outlets which I.C.I. intend to develop.

## Conch Design World's First Big Refrigerated LPG Tanker

MORE details have now been released of the LPG tanker that Mitsubishi are building for the Bridgestone Liquefied Petroleum Gas Co. Ltd. of Tokyo, which was first referred to in 'Distillates', 25 February. The vessel will have a capacity of 180,000 barrels, equivalent to about 17,000 tons of refrigerated LPG at about -40°F, and a service speed of 16 knots.

The ship was designed by Conch International Methane Ltd. and the special low-temperature features are based on Conch patents under a licence agreement with Bridgestone. Conch also designed the *Methane Pioneer*, which brought about 14,000 tons of liquid methane from the U.S. Gulf Coast to Canvey Island for the Gas Council; the

new tanker will incorporate much of the know-how and experience gained from the earlier vessel which is now on charter carrying chemical cargoes.

The Bridgestone tanker will be the world's first large-scale commercial ship to carry LPG at essentially atmospheric pressure; it is scheduled for completion early in 1962 and will take LPG from Kuwait to Japan.

## Roger Williams Move London H.Q.

Roger Williams Technical and Economic Services Inc., on 6 March, moved their London headquarters to Mellin House, Hallam Street, London W.1. (Langham 3708.)

## 'Water-bridge' Technique for Evaluating Fungicides

**E**VALUATION of a new fungicide usually involves a series of laboratory experiments that essentially measure the growth of fungi when they are exposed to the fungicide.

In one common laboratory screening method, suspensions of fungus spores are either added to a dried chemical film or incorporated in chemical suspensions or solutions. The percentage of spore germination presumably determines the effectiveness of the chemical. Experience has shown, however, that a chemical may be effective in this type of test but ineffective in the field.

Under field conditions fungicides are usually applied to plants in a water medium. After the water evaporates, the chemical remains in a thin residual film on the leaf surfaces. Chemical changes may or may not occur during this transition. Aeration, radiation, and other factors may collectively or separately affect the chemical film to make it more or less fungitoxic.

Among the factors that may affect toxicity is meteorologic water (any water coming from the atmosphere, such as rain or dew). This water is necessary for the dissemination and germination of many fungus pathogens. Unless the chemical can diffuse through the meteorologic water in a fungicidal state to reach the fungus spore, the spore will germinate normally and infect the plant.

Recent experiments at the University

of Illinois—reported by Dwight Powell of the Department of Plant Pathology—have tested the ability of a chemical to remain fungitoxic after diffusion through water. In these tests, the chemical is placed on one end of a glass slide and a spore suspension on the other end, about two inches away. The two are connected by a 'water bridge'.

Many chemicals which proved fungitoxic in the usual type of laboratory test did not diffuse through the water bridge in a toxic state. Such chemicals have also proven ineffective in the field. Thus, there is a direct correlation between the ability of a compound to diffuse through water from a dried film and its satisfactory performance under field conditions.

It is believed that the 'water bridge' technique will considerably enhance knowledge of a chemical in the laboratory screening programme and will reduce the amount of field experimentation necessary to determine the effectiveness of a new fungicide.

### Recommendations for Use of Mecarbam and Phenkapton

Mecarbam and phenkapton have been recommended for safe use in Great Britain on non-edible crops. Both compounds should be included in the Agricultural (Poisonous Substances) Regulations as Second Schedule, Part III, substances.

## New Company Formed to Handle Protexulate Gases

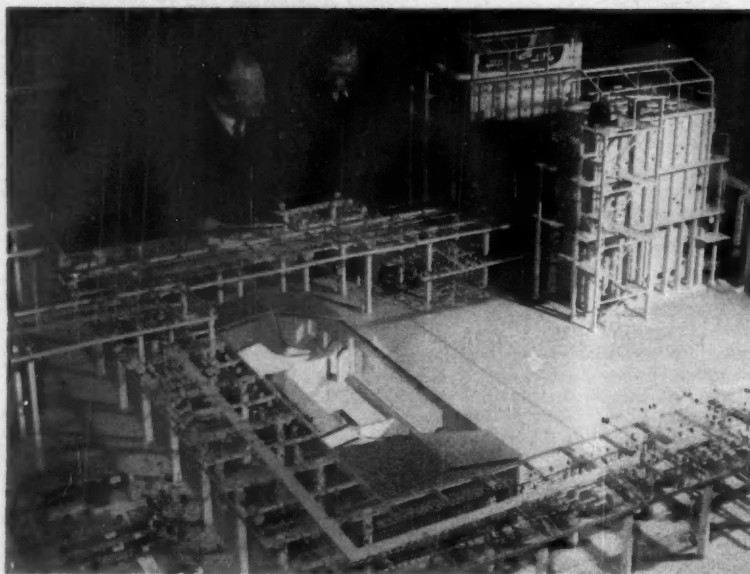
**B**ECAUSE of the big demand for their recently introduced product, Protexulate, Croxton and Garry Ltd. have found it necessary to set up a subsidiary company to be known as Protexulate Ltd., with headquarters at 27 St. James Road, Kingston-on-Thames, Surrey (Kingston 9444). From 15 March the company will handle all future business regarding this new method of insulating and protecting buried pipework.

Protexulate is a fine mineral powder that provides buried heating pipes with efficient thermal insulation and protection from corrosion. The material is said to be permanently waterproof; to have thermal conductivity as low as  $k=0.912$ , depending on temperature; a dielectric constant of 2.7; to give complete protection against corrosion; and to be non-inflammable (see also C.A., 8 October 1960, p. 574).

The material is poured direct from bags into the trench covering the pipeline to a depth based on the dimensions of the pipes; the empty multi-ply paper bags are then placed over the powder and the trench filled in. No curing process or protective coating is needed for the pipes, nor is any concrete ducting and lagging required. The same powder can be used again should resiting of installations be proved necessary.

Sales manager of the new company is Mr. John L. Wylie; the new Scottish office of Croxton and Garry Ltd., at 312 High Street, Glasgow, C.4 (Bell 0899), will also handle Protexulate enquiries.

## Model of Humglas Ethylene Plant



This scale model of an olefin plant, insured for £12,000, is the central feature of the Humphreys and Glasgow stand at the Leipzig Trade Fair. Made of wood, wire and plastics, the model is of the ethylene and benzene plant that Humglas are building at Leuna, East Germany. It took five draughtsmen six months to complete

## New Booklet Explains E.E.U.A.

**A**IMS and organisation of the Engineering Equipment Users Association—set up in 1949 to promote the standardisation of engineering products used in the process industries, and to create a free exchange of technical information on engineering matters—are set out in a booklet just issued by the Association and available, free of charge, from the general secretary at 20 Grosvenor Gardens, London S.W.1.

Membership is restricted to companies and other bodies who are predominantly users rather than manufacturers of engineering products. Present membership includes I.C.I., Distillers, Albright and Wilson, Courtaulds and a number of other well known chemical and process firms.

## Computer Course

A short course designed to acquaint technical management with the application, scope and limitations of analogue computers is being held by the College of Technology, Loughborough, from 10-11 April. The course will be split into four groups: electrical, mechanical, aeronautical and chemical engineering.

Enquiries to: Dr. H. Buckingham, College of Technology, Loughborough.

## Overseas News

### WEST GERMAN CHEMICAL TURNOVER WAS UP 12% LAST YEAR

**D**URING 1960 West Germany's chemical industry recorded a turnover of DM23,170 million. Excluding the DM171 million accounted for by the chemical industry of the Saar which was included for the first time in national turnover figures, West German sales last year were higher by 12.1% than that for the previous year. The production index rose by as much as 14.7% to a 1960 figure of 312 (1938: 100), prices falling by half a point over the year to 183 (1938: 100). Since 1950 prices in the West German chemical industry have risen by only 4% as against an increase of 26% for industry as a whole.

Production of plastics materials in West Germany last year totalled 996,000 tonnes, or 25% up on 1959. Greatest production increase was in the field of polymerisation plastics, output increasing by some 30% to reach 488,000 tonnes, or 49% of total plastics production. Above-average increases were reported in this field for the polyolefins, particularly high-pressure and low-pressure polythene, and for co-polymers.

Polycondensation and polyaddition products increased their output by 24% to about 400,000 tonnes over 1960, with particular increases in the field of phenolic resins. Output of cellulose derivatives rose by 11% to 108,000 tonnes.

Exports of plastics raw materials is estimated at over DM800 million for 1960, main customers being Holland, the U.K. and Italy, while imports totalled some DM270 million, main suppliers being the U.S., Italy and the U.K.

### Canadian Sulphur Recovery Plant Approved

Alberta Oil and Gas Conservation Board have told Shell of Canada that their plans to construct a \$20 million plant for gas processing and sulphur recovery in south-west Alberta will be approved. Construction should be completed by end 1961.

### CIBA Establish Australian Subsidiary

CIBA have opened a new factory for the production of chemicals, dyes and plastics in New South Wales. The factory will be operated by a newly established subsidiary of CIBA.

### Petrochemical Know-how Sought by Japanese Firm

The Japanese company, Shin Nippon Chisso Hiryo, have decided to buy petrochemical know-how from D. F. Othmer, U.S. chemical engineering consultant, and

have applied to the Science and Technical Agency for approval.

The company has embarked on the first stage of its petrochemical plans which include the manufacture of polypropylene, polybutene, acetaldehyde, octanol and acetic acid. Information is sought from the U.S. to expand further in the petrochemical field. The contract will be for a year and will cover the use of the butyl benzene fraction and of toluene, new types of synthetic rubber and the manufacture of synthetic fibres.

### New Plants to Meet Australia's Demand for Industrial Gases

Several new plants have been constructed by Commonwealth Industrial Gases Ltd. in Australia to meet the increasing demand for industrial gases.

In Queensland, the transfer of the company's oxygen facilities to a new site involved the expenditure of £A700,000. In South Australia, a new acetylene works began production in 1960, and in New South Wales the company has been building a nitrogen plant at an estimated cost of £A62,000. Last year the company showed a record profit of £A1,339,970.

### Staatsmijnen May 'Free' Chemical Interests

According to a statement made by Dutch Minister Zijlstra, the freeing of the chemical section of the Dutch coal-mining and chemical concern Staatsmijnen, of Limburg, from State ownership will be considered in co-ordination with the Dutch Ministry for Economic Affairs should Staatsmijnen become increasingly a chemical undertaking in the future.

### 15,000 T.P.A. Carbon Black Plant for Mexico

The Mexican Government has granted permission to Negro Mex S.A. to erect plant in Mexico for the production of carbon black and derivatives. The company, some 90% of whose capital will be in Mexican possession, will build a unit with a capacity of 15,000 annual tonnes and costing an estimated Pesos 32 million.

### East Europe's Mounting Output of Plant

Figures issued from the capitals of a number of East European States show the increased production of chemical plant behind the Iron Curtain over last year. In the Soviet Union chemical plant production was worth a total of 224 million new roubles, as compared with a 1959 figure of only 170 million new

roubles (equivalent). In Czechoslovakia production chemical plant in 1960 was worth 794 million Czech crowns, or 30.6% up on the previous year. Rumanian chemical plant production for 1960 amounted to 16,832 tonnes, or 45% more than in 1959, this total excluding 7,391 tonnes of oil processing plant (plus 38%).

### Norsk Hydro Complete First Stage of Ammonia Expansion

First stage of their ammonia expansion project at Glomfjord, Northern Norway, has been completed by Norsk Hydro. Capacity for ammonia has been raised from 65,000 to well over 70,000 tons/year. The second stage, bringing capacity up to 86,000 tons, will be completed in 1964-65.

### Increased Canadian Chemical Output in 1960

Production of most chemicals in Canada during 1960 was greater than in 1959. Some examples are: hydrochloric acid, 47,540,951 lb. (42,567,405 lb. in 1959); sulphuric acid, 1,652,892 tons (1,609,574); chlorine, 320,087 tons (286,885); mixed fertilisers, 817,245 tons (793,601); formaldehyde, 58,282,160 lb. (56,112,290); and sodium hydroxide (caustic soda), 376,125 tons (339,530).

### Montrose to Expand Mexican Chlorine Units

The Mexican chemical concern Montrose Mexicana S.A. are to spend Pesos 30 million on the extension of their Salamanca plant, at which soda, chlorine and DDT are produced. As part of a Pesos 360 million investment programme planned by Intercontinental S.A. production is to begin of activated carbon and other chemical products. At the same time the Mexican cellulose concern Celulosa de Chihuahua S.A. announce plans to invest Pesos 250 million in their production units over the coming five years in order to raise annual output to 100,000 tonnes.

### Hold-up in Opening of Polish Phenol Plant

The opening of a phenol plant due to be brought into operation last year at the Oswiecim chemical combine in Poland has been delayed owing to a hold-up in supplies and for other reasons.

### New U.S.S.R. Instrument Measures 10,000°C.

An instrument claimed to measure temperatures up to 10,000° C. has been developed by the High Temperature Laboratory of the U.S.S.R. Mendeleyev Metrological Research Institute.

The instrument operates on the basis of the comparison between the radiation of a heated body and that of the metal filament of an ordinary incandescent lamp. If the radiation of the light source is too high, it is reduced by interposing occluding glass filters.

The problem of graduating the scale so as to bring the instrument errors down

to a minimum, the main difficulty has been successfully overcome, and pyrometers are now being calibrated to measure temperatures up to 10,000°C.

This type of pyrometer is already being used in industry in the U.S.S.R. and other countries.

### Du Pont to Enter Acetylene Field

Du Pont are to enter the acetylene field with a new modified arc technique which uses a feed of any gaseous or liquid hydrocarbons. The new process will be used in 50 million lb.-a-year plant to be built at Montague, Michigan, where Du Pont already have a neoprene plant. The new facility is expected to be completed by early 1963.

### Bulgarian Petrochemicals Plant Will Use Soviet Oil

Bulgaria's biggest mineral oil processing plant is to be built near the port of Burgas, drawing Soviet oil as feedstock through a 17-mile pipeline from Burgas. To start production of oil in 1963, the plant will later take up production of annually 43,000 tonnes of ethylene, 10,000 tonnes of polythene and 27,000 tonnes of liquid methane. The petrochemical section of the plant will produce the materials for a further new plant to be constructed with an annual turn-out of 30,000 tonnes of synthetic rubber.

### New Facilities for Alkylamines Completed By Union Carbide

A new unit for producing alkylamines has been completed and placed in operation by the Union Carbide Chemicals Co. at its South Charleston, West Virginia, plant. Ethyl-, butyl- and isopropylamines are now being manufactured in commercial quantities. The new plant is designed so that other alkylamines may be produced as markets for them develop. Major markets for alkylamines are intermediates for both rubber accelerators and agricultural chemicals. They also are used in the synthesis of crease-resistant resins for textiles and as intermediates for many pharmaceuticals.

### Hydroxamic Acids Available from U.S. Company

The U.S. company, Woburn Chemical Corp., have introduced two new fatty hydroxamic acids which are now being produced commercially. These intermediates, containing a reactive OH and NH group as well as a long straight chain fatty group, are capable of reacting with alkalis, metallic ions and acrylating agents. On heating, they form isocyanates which can be reacted further with alcohols and amines to form urethanes and ureas. The isocyanates form carbamic acid with water.

Industrially, fatty hydroxamic acids may be used for surface-active compounds, pigment dispersants, dyeing acids, detergents, disinfectants, antioxidants, corrosion inhibitors, lubricant additives, chelating and for many other purposes. A bulletin describing these products is available from Woburn Chemical Corp., Harrison, N.J.

### Japan Develops New Ammonia Synthesis Catalyst

The Tokyo Government Laboratories have developed a catalyst for the synthesis of ammonia which has, it is claimed, a life of 13,600 hours compared to the 300 to 2,000 hours of the existing catalysts. One ton of this catalyst will consequently produce 130,000 tons of ammonia compared to 1,000.

Toyo Katsui Industries is using the new catalyst in a plant built at their Hokkaido works with a capacity of 200 tonnes a day, and the results are said to be quite favourable. The plant is based on the Claude process. The catalyst has also been adopted by Showa Denko and Tao Gosei, both of whom use a low pressure process.

### Foot Mineral Plan Manganese Plant in Sardinia

Foot Mineral Co., of the U.S., are negotiating the erection of a plant at Carbonia, Sardinia, for the electrolytic production of manganese. One of the conditions set up by the company is a guaranteed supply of water at the rate of 15 l/sec rising to 25 later. It is understood that there will be some form of co-operation between the new plant and the electrolytic-aluminium plant planned in Sardinia by Montecatini. The nature of this co-operation has not been disclosed, but it is possible that it concerns supplies of water and electric power.

### CTC Aids Fumigation of Stored Grain

The use of carbon tetrachloride as a carrying agent for fumigant gases used against mould and insects in stored grain has been successfully demonstrated at the Canadian Department of Agriculture's Winnipeg Research Station in Manitoba. This may lead to the use of cheaper and more effective fumigants in stored grain.

During experiments carried out by B. Berck, head of the research station's chemistry section, carbon tetrachloride was found to boost the downward movement of the more toxic gases employed as fumigants.

Four fumigants—methyl bromide, ethylene dibromide, acrylonitrile, and chloropicrin—were tested in seven-foot

columns of wheat, both with and without carbon tetrachloride. In all cases carbon tetrachloride assisted the downward action of the other gases despite the retarding influences of a low grain temperature of 40°F and a high moisture content of 20%.

Ethylene dibromide, when applied alone, remained at the surface of the wheat. Acrylonitrile and chloropicrin, when applied singly, penetrated very slightly. While not very toxic to insects when used alone, carbon tetrachloride acts as an excellent carrier for the more toxic fumigants.

### Defoliating Cotton with Tributyl Phosphorotriethioate

A method of defoliating cotton by applying tributylphosphorotriethioate has been described in U.S. Patent 2,955,803 by Virginia-Carolina Chemical Corporation, Richmond, Va. The phosphorus chemical, which is the basic ingredient in the formulation of the defoliant is sold commercially as merphos, while the defoliant is retailed as Folex. The company intends to 'police' its exclusive rights to the use of merphos in defoliant.

### U.S. Nuclear Reactor and Enriched Uranium for Finland

Finland will acquire from U.S. sources not only a 100 kw training and research nuclear reactor but also the enriched uranium required to fuel it under two agreements recently concluded between the International Atomic Energy Agency and the Governments of Finland and the U.S. The fuel involved is approximately 13,000 g. of uranium enriched to some 20% by weight in the isotope U-235 and some 5 g. of uranium enriched to more than 90%. This is the first transaction in which the I.A.E.A. has participated involving the supply of enriched fuel.

### U.S. Firms to Build \$51 m. Fertiliser Plant in India

International Minerals and Chemicals, New York, Standard Oil of California and the Indian I.E.D. Pary Group, Madras, have been granted Government permission a licence to build a \$51 million fertiliser plant near Vizagapatam.

## Higher Sales and Production for U.S. Coal Chemicals in 1960

PRODUCTION and sales of most coal-chemicals increased in the U.S. last

year, as shown by the following statistics issued by the U.S. Bureau of Mines:

		Production		Sales	
		1960	1959	1960	1959
Ammonium sulphate .....	short tons	632,350	612,738	597,468	655,446
Ammonia liquor (NH <sub>3</sub> content) ..	"	14,883	14,709	9,403	14,061
Di- and mono-ammonium phosphate ..	"	45,152	46,904	36,383	48,588
Crude light oil .....	gall.	234,494,448	213,036,193	21,180,165	19,514,987
Benzene:					
Nitration (1") .....	"	101,222,575	85,954,961	93,694,565	87,792,269
Industrial pure (2") .....	"	32,630,126	32,036,142	32,567,915	33,897,009
Industrial 90 .....	"	1,484,686	1,416,143	1,510,587	1,362,057
Motor grade .....	"		497,274		531,292
Other industrial grades .....	"	403,208	423,759	163,016	438,488
Toluene:					
Nitration (1") .....	"	24,799,739	21,160,713	23,699,537	21,118,866
Industrial pure (2"), etc. ....	"	5,854,672	5,803,218	6,122,094	5,387,776
Xylene (all grades) .....	"	8,158,010	7,523,530	7,656,052	7,640,893
Solvent naphtha (crude & refined) ..	"	4,584,108	4,023,251	4,566,629	3,791,371
Crude coal tar .....	"	687,524,882	653,728,164	298,646,281	299,642,785
Crude chemical oil .....	"	27,589,804	20,958,212	27,336,372	21,158,983

\* Not available

## U.K.—E. German Agreement Includes Chemicals

NEGOTIATIONS between the Federation of British Industries and the East German Chamber of Foreign Trade has resulted in an agreement which allows for a total volume of £18 million worth of trade to pass in both directions between the two countries. This shows an increase of 28% over the £14 million of 1960.

Actual trade realised in 1960, according to Board of Trade figures, amounted to £6.3 million for British imports and £7 million for U.K. exports to East Germany, against the agreed quotas of £7 million for trade in each direction.

Export quotas for many items have been increased, including chemicals from £175,000 to £400,000 and measuring, testing and other scientific instruments from £115,000 to £200,000.

## Steady Rise in U.K. Oil Equipment Orders

ORDERS for materials and equipment placed in the U.K. by oil companies during 1960 reached a total value of £118,911,930 compared with £117,256,894 in 1959. Orders for bulk chemicals, catalysts, barytes and allied materials during the period October-December 1960 reached a value of £7,087,254, compared with £8,729,830 in the same quarter of the previous year. Under the heading of "Laboratory equipment and chemicals including hospital and medical supplies", orders were received in October-December to a value of £360,187 (£398,465).

By contrast, there was a big increase in orders for specialised equipment for oil refineries, etc. (not including pumps and valves) which attained a value of £1,483,572 as against only £756,089 in the last 1959 quarter. Orders for tubulars, pipe fittings and valves remained steady at £3,291,165 (£3,292,254) while pumps (excluding slush, oilwell and kerbside) were ordered to a value of £435,225 (£467,798).

Total value of all materials and equipment ordered by oil companies in the fourth quarter of 1960 was £28,604,545 compared with £34,077,209 for the same quarter of 1959. Figures for the third quarter (July-September) were: 1960, £29,679,018; 1959, £26,509,502.

The foregoing figures have been issued by the Council of British Manufacturers of Petroleum Equipment, and were compiled by the Oil Companies Materials Association.

## I.C.I. Nobel Get Permission for H.Q. Move

I.C.I., Nobel Division, has received planning permission from Ayr County Council for new offices at Ardeer to replace the Glasgow headquarters, at Sauchiehall Street, which I.C.I. will vacate in a phased transfer, bringing administration closer to production. The new office block is a four-storey building. The transfer will also involve the staff at Nobel House, Bothwell Street, Glasgow.

# Dialdehyde Starch Compound Developed in U.S. Gives Improved Strength to Paper

A NEW dialdehyde starch compound that gives greatly improved strength to paper has been developed by Miles Chemical, Elkhart, Ind. The new compound is a development from a dialdehyde starch which Miles began to make on semi-commercial scale a little over a year ago, using a process based on a modification of the periodic acid oxidation technique worked out by the U.S. Department of Agriculture (CHEMICAL AGE, 23 January 1960, page 160).

The original dialdehyde, marketed under the name of Sumstar, is used in the tobacco industry as a leaf binder. Sumstar appeared to have potentialities in paper-making; in combination with alum or cationic starch it could be used as a beater additive, but it had disadvantages—for example, the wet strength imparted to the paper diminished after a few hours and its use as an additive was costly, since retention was only 25%.

However, paper treated with 4% Sumstar 190, the new dialdehyde starch, gains 700% in wet tensile strength, 45% in dry tensile strength and 400% wet tear strength over untreated paper, it is claimed. It has considerable advantages over the earlier product when used as a beater additive, giving retentions as

high as 98%.

Tests on the chemical were carried out on western softwood kraft, an intrinsically strong pulp. Apart from the increases of strength obtained, the product has other advantages. It gives papers that meet the required strength specifications but which take less pulp; it needs less beating time, allowing faster drainage and therefore higher production rates; it needs no curing, as do the currently used urea or melamine formaldehyde resins; and it creates no waste recovery problems since it is not a thermosetting resin. Commercial trials have given equally good results.

It is believed that Sumstar 190 acts by forming bonds with the fibres in the paper. Conventional beater additives give a specific property to paper by the binding of the additive on to the paper by physical means. These properties, however, are often imparted at the expense of other properties—for example, rosin size lowers dry strength and the usual wet strength resins reduce absorbency. Miles feel that only a chemical reaction between the additive and cellulose can explain the absorbency, porosity, stretch, and improved strength properties that Sumstar 190 imparts.

## Metco's New Plasma Flame Spray Gun Gives High Temperature Coatings

DEMAND for materials to withstand very high temperatures that has arisen with space technology has brought plasma spray coating, only a few years ago confined to research and development studies, into the fore.

Plasma spraying is carried out by passing an inert gas, such as helium or argon, through a high energy arc where it forms a plasma made up of a mixture of free electrons, positively charged ions and some neutral atoms that collide and produce temperatures of the order of 30,000°F. The powder to be sprayed (extremely high-melting-point materials such as metals, oxides, carbides and nitrides) is fed into this plasma stream just before it leaves the gun and is instantly melted, then projected at about 34,000 ft. per sec. on to the prepared base material such as graphite, brass, steel and certain reinforced plastics.

The bonding between the coating and the base material is achieved by mechanical interlocking, metallurgical alloying or chemical transformation, according to the type of material or plasma jet used. In spite of the high temperature of the plasma, heat is dissipated quickly once the plasma stream leaves the gun. The inert plasma stream surrounds the par-

ticles and the substrate and prevents oxidation.

Being exhibited for the first time in the U.K. at the Engineering and Marine Exhibition, is the Metco Ltd. plasma flame spray gun. The equipment has been designed for development work in the jet and rocket motor fields, missile work, nuclear and electronic industries and research work into applications involving the use of high temperature materials.

Materials that can be sprayed include chromium, cobalt, molybdenum, tungsten, chromium carbide, tungsten carbide, rare earth oxides, titanium oxide, calcium zirconate and in fact most materials that do not decompose when melted. These materials applied with the Type MB plasma flame spray equipment give a dense coating and a high degree of bond to the base metal.

## Import Duty Application Withdrawn

The application for removal of import duty on aluminium lithium hydride, falling under tariff heading 28.57(A), has now been withdrawn, according to the Board of Trade.

## Bookshelf

# PROGRESS REPORT ON BLOCK AND GRAFT POLYMERS

BLOCK AND GRAFT POLYMERS. By W. J. Bruland and A. S. Hoffman. Reinhold, New York; Chapman and Hall, London. Pp. vi + 166. 64s.

The subject of block and graft polymers is of very recent growth. This is clearly demonstrated by the references in this book which are almost exclusively culled from the literature of the late fifties. The subject is also of great industrial interest, but to this the references are no guide. This can be attributed to the delay in the issue of patents. After a brief chapter on nomenclature the material is arranged in chapters written around the means of producing the polymers. Hence we have 'Chain transfer reactions' (23 pages), 'Radical attack of unsaturated backbones' (21), 'Reactions of macromolecules containing functional groups' (44), 'Photolytic reactions' (8), 'Ionizing radiation' (38), followed by 'Mechanical degradation' (10) and 'Stereoblock polymers' (8). The mechanical and physical properties of the polymers are discussed immediately after the description of the method of formation.

This book should be regarded not as a treatise but a progress report. There are very few sections that can be regarded as the last word on the subject. No doubt the book will be very welcome to the many scientists, who in the next few years will do research on these polymers, as a clear and stimulating account of the state of the art—for such it clearly is at present.

## Science of Rubber

THE APPLIED SCIENCE OF RUBBER. Edited by W. J. S. Naunton. Edward Arnold, London, 1961. Pp. x + 1191. Price £8 8s 0d.

This is a co-operative effort, approved by the Institution of the Rubber Industry, consisting of 13 chapters. Each chapter, other than that on analytical methods, is in two parts, dealing respectively with the general scientific and with the technological features of some aspect of the rubber industry. Accordingly, there are 25 authors, all prominent members of British rubber interests.

The relative weightings of natural and synthetic rubber emphasises the British interests and procedures forming the basis of the volume. A few points arising from a cursory examination of it may be given. The section of 90 pages on the chemistry of natural rubber is one of the most fully referenced articles. Chap-

ter VIII, Part I, on the fundamentals of measuring the elasticity and dynamic properties, is outstanding in showing a fully scientific approach and is the sort of account from which readers can acquire a fuller understanding of the procedures involved. It is followed by a coherent account of the technical methods.

A very considerable fraction of the volume is of a descriptive, qualitative nature, bordering on a reference or recipe book. Maybe this is what is useful in industrial laboratories: but it gives the impression that rubber technology is far more of an art than a science. Part II of the chapter on synthetic rubber research shows considerable scientific naivete: e.g. on p. 246, "Dilatometric and calorimetric measurements are more reliable than X-ray diffraction for the study of crystallisation phenomena"; p. 249, "Since rubbers can be regarded as liquids, it follows that there is no distinction between a solution of the rubber and the rubber itself".

The subject index is likely to prove inadequate: e.g. "elasticity" is not included, and there is no account in the 1,191 pages of the molecular mechanism of this property. In the form here marketed Applied Science sells at approximately 33s per pound weight or 2d per page. An exorbitant price.

## Pressure Vessels

NUCLEAR REACTOR CONTAINMENT BUILDINGS AND PRESSURE VESSELS. Edited by Engineering Department, Royal College of Science and Technology, Glasgow. Butterworths, London, 1960. Pp. viii + 572. 100s.

An international symposium on nuclear containment buildings and pressure buildings was held in Glasgow in 1960. The 22 papers, together with the discussions arising therefrom, have now been printed.

For the first section, four articles were presented on current practices and trends in design, development requirements, safety criteria, and the merits and defects of reinforced concrete for containment buildings. The design of steel containers for nuclear reactors and associated equipment in the U.S., an engineering analysis of the Enrico Fermi fast breeder reactor built at Detroit, and methods of stress analysis make up a second section. To follow these, and taking up almost half of the book, are various considerations of steel shell structure such as buckling problems, loading actions, thermal

stresses and creep. In common with all the articles, the script is liberally embellished with figures, photographs, tables, curves and the appropriate mathematical treatments. Other topics which are featured in later sections include aspects of building design, the fabrication, testing and erection of pressure vessels, brittle strength and fracture. Then to round off matters there are summaries of each section.

A good proportion of this publication should be worth digesting by engineers and chemical engineers outside of reactor technology. It is common knowledge that reactor engineers have been faced with, to quote from the preface to this book, "unconventional and complex problems". The solving of these has, and will, bear fruit in many other quarters.

## Lignin Chemistry

THE CHEMISTRY OF LIGNIN, SUPPLEMENT VOL. By F. E. Brauns and D. A. Brauns. Academic Press, New York, 1960. Pp. x + 804. \$18.

The chemistry of lignin was the subject of an earlier extensive work by one of the present authors; although only eight years have elapsed since the earlier publication, so great a mass of new information has been published as to necessitate a second considerable volume, reviewing the literature between 1948 and 1958. This in no way replaces the previous book, but is intended to bring it up to date: to assist in correlating the new matter with older work numerous references are given to the 1952 edition. The first part of the book reviews the literature on the isolation, determination and the colour reactions of lignin together with a chapter on its physical properties. The greater body of the book deals with the chemical reactions of lignin and the book concludes with chapters on the biological decomposition, and biosynthesis, theories on the structure and the linkage of lignin in the plant. The literature is covered up to 1958, references being given at the chapter ends. While the main appeal of the book is naturally for the specialist, the presentation and style of the writing are such that all chemists would find something of interest in it. To those working in this field this book will be an essential tool. The quality of printing and binding is excellent.

## Books Received

THE DETERMINATION OF GASES IN METALS—Report of a symposium organised by the Society of Analytical Chemistry. The Iron and Steel Institute, 1960. Pp. viii + 308. 63s.

REFRIGERATION ENGINEERING—A SOURCE BOOK OF SOVIET LITERATURE 1923-1955. By D. N. Prilutskii. Israel Program for Scientific Translations, 1960. Pp. 296. 50s.

● **Mr. W. Hunter, B.Sc., F.R.I.C.**, has been appointed a director of British Celanese Ltd. With British Celanese since 1939, Mr. Hunter was previously general manager (production) of the company's plants at Spondon, Wrexham and Little Heath, Coventry.

● **Dr. M. F. Lappert**, lecturer, has been appointed senior lecturer in chemistry, faculty of technology, Manchester University.

● **Mr. James Oldroyd, T.D., M.A., F.C.I.S.**, secretary of the British Electrical and Allied Manufacturers' Association, has been appointed general manager of the Lead Development Association. He will take up his new work in April.

● **Mr. Donald Maciver, A.R.I.C.**, who has been appointed a research chemist at the laboratories of the Pyrethrum Board of Kenya at Nakuru, was formerly at the Glenochil laboratories of the Distillers Company, followed by three years as a research chemist with British Resin Products Ltd., one of the D.C.L. Group. **Mr. Richard Allan** has been appointed chief entomologist to the Pyrethrum Board.

● **Mr. George Selwyn Holland**, sales director of J. H. Lea and Sons, agricultural merchants, Sandbach, Ches., has been appointed managing director of Liquid Fertilizers Ltd. and will take up his duties at Batley, Yorks. on 1 April. Aged 42, Mr. Holland has been engaged in the seed and fertiliser business for 17 years. Liquid Fertilizers are one of the group headed by Hargreaves (Leeds) Ltd.

● **Mr. N. Peter Newton, F.R.I.C., F.R.S.M.**, 39, has been appointed general manager of the Lederle Laboratories Division, Cyanamid of Great Britain Ltd., with headquarters at Bush House, Aldwych, London W.C.2. He joins



N. P. Newton

Lederle from Smith and Nephew Pharmaceuticals Ltd. of which he was sales director from 1957. A Territorial at the beginning of the war, Mr. Newton became an experimental officer with the Chemical Defence Research Establishment at Porton Down. On demobilisation in 1946 he joined the Insecticide Division of Geigy Pharmaceuticals before being appointed southern district manager in 1951.

● A total of 18 research fellowships have been awarded by the Department of Scientific and Industrial Research. The awards are for young postdoctorate

## PEOPLE in the news

research workers of exceptional promise in science and technology. They include seven awards for chemistry: **G. R. Newns**, Birmingham; **J. Whiston**, King's College, Durham; **G. G. Cameron**, Glasgow; **B. Mile**, Leeds; **W. J. Kirkam**, University College, and **R. H. McDougall**, King's College, London; and **A. H. Neilson**, Oxford. The award of the N.A.T.O. science research fellowships financed by the North Atlantic Council have also been announced. These include 10 for chemistry to research workers in South Africa, Germany (2), Switzerland, U.K. (5) and U.S.

● **Sir Thomas Scrivenor, C.M.G.**, has been appointed secretary of the executive council of the Commonwealth Agricultural Bureaux with effect from 10 April.

● **Mr. R. A. Richardson** has been appointed a director of Osma Plastics Ltd. as a result of the company's expansion programme. He joined the company (formerly G. H. Osborn Building Products Ltd.) in 1957 and was instrumental in creating the sales policy and the investigation of new plastics applications for the building industry, and has since held the post of sales manager, building division.

● **Mr. George Halek** has been appointed works manager of Kemball, Bishop and Co. Ltd., a member of the Pfizer Group. Previously he was head of organic production at the Sandwich plant of Pfizer Ltd.

● **Mr. R. L. H. Damerham**, executive director of Durapipe and Fittings Ltd., West Drayton, Middlesex, is in the U.S. on a three-week study tour of plastics manufacturing plants. He will renew contact with former colleagues in the manufacturing and research fields in which he worked for some years in the U.S. He is chairman of the plastics fittings sub-committee of the British Plastics Federation and U.K. delegate to the International Standards Organisation, and will be having talks with his opposite numbers in the American Fittings Manufacturers' Association, Society of the Plastics Industry and American Society for Testing Materials. He will also meet

distributors to discuss arrangements for strengthening Durapipe's sales in North America.

● **Mr. Denys S. Asbury** has been appointed assistant secretary to the Laporte Group of Companies, Hanover House, Hanover Square, London W.1.

● **Jonkheer A. C. D. de Graeff** is to replace **Mr. J. W. H. van den Wall Bake** on the board of the Dutch Royal-Dutch-Shell Group chemical company Bataafse Internationale Chemie Maatschappij.



D. M. Bell, first chairman of I.C.I.'s European Council (see C.A., 4 March, p. 356)

● **Mr. K. Clark** has been promoted from 1 April to the new position of assistant export manager, Acheson Colloids Ltd., a subsidiary of Acheson Industries (Europe) Ltd., 1 Finsbury Square, London E.C.2. This appointment is the first step in an expansion programme designed to increase overseas outlets for the Dag range of dispersions. Acheson Colloids are now responsible for marketing these products in all parts of the world outside North America and West Europe. For the past three years, Mr. Clark has been sales supervisor for Acheson Dispersed Pigments. **Mr. C. R. Wills**, general manager of Acheson Colloids, will temporarily assume the additional responsibilities of export manager.

● **Mr. John Solbett** and **Mr. Derek Lennon** have been appointed associate directors of Humphreys and Glasgow Ltd. Mr. Solbett, previously with Simon-Carves Ltd. for a number of years, joined Humglas in September 1956 as senior chemical engineer and was appointed chief chemical engineer in June 1959. Mr. Lennon, after spending a year in the U.S. on a Sir Stuart Goodwin Fellowship, joined the company in July 1957 as a senior chemical sales engineer and was stationed in Milan for some time. In May 1959 he was appointed a director of the Humglas French associate company, Sté de Construction d'Appareils pour Gaz à l'Eau et Gaz Industriels.

● **Mr. Ivon A. Bailey** has been elected vice-president and **Mr. John O. Hitchcock** an assistant vice-president of the International Nickel Company of Canada Ltd. effective 10 April 1961. Mr. Bailey remains chairman and chief officer of the International Nickel Co. (Mond) Ltd. and of Henry Wiggin and Co. Ltd. Mr. Hitchcock remains managing director of the International Nickel Co. (Mond) Ltd. and deputy chairman of Henry Wiggin and Co. He will also continue as second chief officer of both companies.

## Commercial News

### Anchor Chemical

In the year ended 30 November sales by the Anchor Chemical Co. Ltd. of their own manufactured products rose by 22% and exports by a similar percentage. Total sales last year rose by 18% to a record of more than £7 million, the net profit was £121,251 (£89,438), with a dividend of 17% (equivalent of 13½%).

Sales are continuing on a satisfactory level and subject to reasonable economic stability, Mr. Thomas Martin, chairman, sees no reason why progress should not continue in 1961.

### Barrozone

Barrozone, chemical manufacturers of Glasgow, are being acquired by Wallace Cameron and Co., adhesive dressing manufacturers, for, it is understood, a price exceeding £500,000. No substantial changes in the management are planned.

### F. W. Berk and Co.

Pre-tax profit of F. W. Berk and Co. Ltd. for 1960 was about £679,000, a rise of about 30% on the 1959 figure of £522,520, according to a preliminary statement. A final dividend of 6d per share is to be recommended on ordinary, making 8½d (7½d).

A provisional arrangement has been made to acquire on a share-exchange basis, the whole of the share capital of St. Albans Sand and Gravel Co. Ltd., a private company with a net book asset value of £633,000. Final terms are still being negotiated, but it is hoped that full information, with notice of an extraordinary general meeting to propose the necessary increase in share capital, will be posted on 14 March. Annual meeting will be held at Berk House, London W.1, on 11 May, at 11 a.m.

### Borax (Holdings)

Group trading profits and other income of Borax (Holdings) Ltd. for the three months ended 31 December were £795,184 (£908,991), after depreciation, etc. of £530,583 (£550,757). Net profit was £494,421 (£586,679). Sales of all products were at about the same level as in the comparable quarter of 1959; the fall in profit was forecast by Lord Clitheroe, chairman, in his recent report and was due to a larger scale of T.V. advertising in the U.S.

### Cambridge Instrument

Net profit of Cambridge Instrument Co. for 1960 was £283,592 (£212,925). Final dividend of 6% makes 22% (equivalent to 20.41%).

### Monsanto Chemicals

For the second year in succession, Monsanto Chemicals Ltd. have reported a record annual turnover. At £20,761,862 in 1960, this was 12% up on the 1959 total of £18,427,505. Direct exports represented 35% of all sales and were

- Anchor Pay More on Increased Profit
- Berk Pre-tax Profit Higher by 30%
- Higher Profits and Sales for Monsanto
- Du Pont Profit Down on Higher Sales

£7,254,551 (£6,877,980). Of 1960 export sales, 41.2% went to the Commonwealth, 19.3% to E.E.C., 12.6% to E.F.T.A. and 26.9% to the rest of the world.

Consolidated profit totalled £5,069,074 (£4,770,074). After charging £1,458,516 for depreciation and obsolescence and debenture interest of £355,000, the pre-tax profit was £2,398,668 (£2,887,662). Tax took £1,251,016 (£1,194,396) and net profit, at £1,146,569 was up 6% on the 1959 figure of £1,336,424. A second interim dividend on ordinary of 10% makes 15% (same). (See also p. 404).

### Joseph Crosfield and Sons

Net profit of Joseph Crosfield and Sons Ltd., a Unilever Chemical Group subsidiary, for 1960 was £1,071,815 (£1,165,203) after tax of £1,002,721 (£877,037).

### Gas Purification

Interim dividend for the year ending 30 June next is to be missed by Gas Purification and Chemical. Pre-tax profit for the half year ended 31 December was about £60,000 (£505,000).

### Parazone Co.

Parazone Co. Ltd., Glasgow, have been acquired by Wallace, Cameron and Co. Ltd., Shields Road, Glasgow, a member of the Smith and Nephew Associated Companies Group. Management and operation of the Parazone Co. Ltd., will continue as formerly.

### Sanitas Trust

Sanitas Trust are bidding more than £1 million for Stevenson and Howell Ltd., producers of essences for the soft drinks industry. Shareholders of the latter company have been advised to take no action pending a statement from the directors.

### E. I. Du Pont de Nemours

E. I. du Pont de Nemours, the world's largest chemical producers, announce a turnover for last year of \$2,143 million (\$2,114 million). Net profit per share fell, however, from \$6.38 to \$5.57, these figures excluding dividend payments to Du Pont from General Motors. The fall in profit is accounted for by falls of an average of 3% in sales prices over the year and higher working costs, these not being offset by a 4% rise in sales.

### Mo Och Domsjö

Turnover of Mo Och Domsjö, Sweden, in 1960 was Kr. 401.6 million (Kr. 358.1 million), while net profit totalled Kr. 11 million (Kr. 9 million). U.K. sales of

cellulose will in future mainly be handled by a new affiliated company in London — Mo and Domsjö Cellulose Ltd.

Production of chemicals in 1959-60 totalled 108,000 tonnes (102,000 tonnes); production of tall oil was abandoned because of difficulties in raw materials supplies and sales and the tall oil section was used to raise acetaldehyde capacity. Production of ethylene oxide is to be transferred to a new site at Stenungsund and will be raised to 10,000 tonnes/year.

### Olin Mathieson

Net sales in 1960 of Olin Mathieson Chemical totalled \$689.6 million, 1.8% down from the record 1959 level of \$702 million. Net profits from U.S. and Canadian operations totalled \$34.6 million, or \$2.59 a share, a drop of 7.8% on 1959 (\$37.4 million, or \$2.81 a share). Chemical sales were valued at \$216.9 million (\$218.1 million), or 31.4% of total turnover. Capital expenditures were \$48.8 million (\$30.2 million) and between \$50 million and \$60 million has been allocated for capital spending this year. Current projects include those for organic chemicals and diversification into new lines; chlorine-caustic soda expansions; cyanuric and concentrated phosphoric acid, etc.

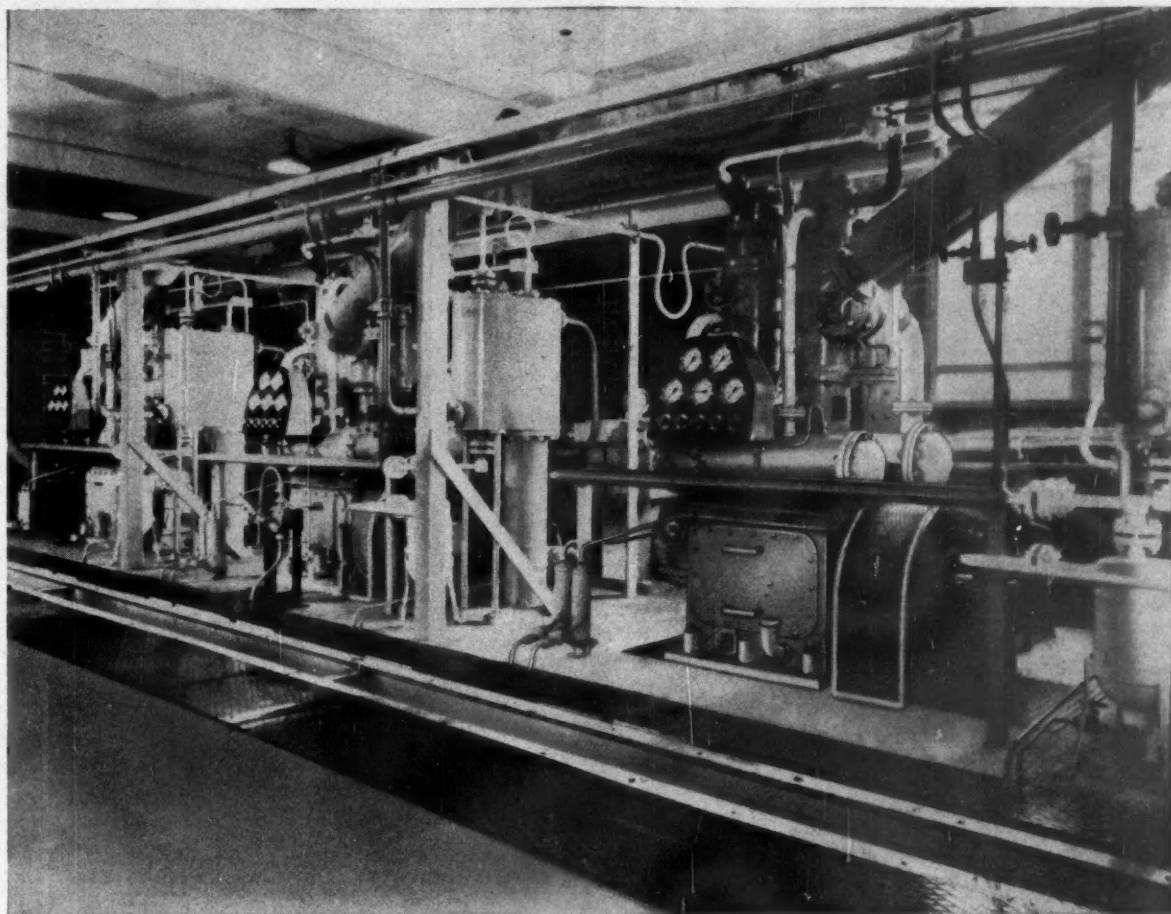
### Tidewater (Nederland)

The U.S. oil refining and petrochemical concern, Tidewater Oil Co., Wilmington, have set up a Dutch subsidiary in Rotterdam under the title of Tidewater (Nederland) N.V. Of the capital of Fl.200,000, Tidewater Oil hold an initial Fl.39,000 and Mr. J. D. Wilson Fl.1,000.

### NEW COMPANIES

ETERNITE CO. LTD. Cap. £20,000. Manufacturers of and dealers in charcoal, activated charcoal and carbon, case hardening compounds, anti-carburising paints, oils, acids, solvents, emulsions, detergents, plastics and general and heavy chemicals; designers and manufacturers of and dealers in plant and equipment, etc. Directors: J. B. Aldred (director of Farnell Carbons Ltd., Workshop Chemicals Ltd., etc.), A. H. Churchhouse (director of Solvents Reclamation Ltd., Wood Distillation (England) Ltd., etc.). Reg. office: Oakwood Chemical Works, Sandy Lane, Workshop.

ENPEEKAY LTD. Cap. £100. Manufacturers, processors, packers and distributors of and dealers in soil conditioners and products in the manufacture of which seaweed may be used or applied; organic fertilisers and manures, etc. Subscribers: Mrs. A. L. Brewer and Mrs. G. C. Sagar. Reg. office: The Court House, Two Chimneys, Praa Sands, Penzance.



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## TRADE NOTES

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Kemitype, one of the Chambon Group of companies, were previously U.K. agents for the range of packaging films manufactured by Kalle of Germany.

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Under the new price structure, cuts

of between 4% and 32% are made on certain sizes of all three types of Durapipe piping and many of the firm's 450 fittings are reduced by up to 20%. Only three of the larger bores of high-impact p.v.c. piping have increased in price—by an average of about 11%. A number of the fittings are now available in additional sizes and materials.

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This publication, which includes more than 1,000 pages with diagrams, and 80 of the papers read at the Congress is available from the Secretariat of the Association Internationale de Cybernétique, A.S.B.L., Rue Basse-Marcelle 13, Namur, Belgium, price Belgian Fr.800 for members of the Association, and Belgian Fr.1,200 for non-members.

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C.S.—Swansea: Univ. Coll. Chem. Dept., 4.30 p.m. 'Development of modern gas kinetics', by Prof. A. F. Trotman-Dickenson.  
Soc. Inst. Tech.—Bristol: Univ. Physics Dept., 7.30 p.m. 'Industrial uses of precision scales', by P. A. McKeown.

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S.C.I.—London: 14 Belgrave Sq., S.W.1, 6 p.m. 'Production of hydrogen from oil', by H. G. Klinkert.

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C.S.—Aberystwyth: Ed. Davies Chem. Labs., 5 p.m. 'Cyclobutadiene—a success story', by Dr. J. F. W. McOrme.  
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C.S. with R.I.C.—Sheffield: Univ. Chem. Dept., 4.30 p.m. 'Some recent developments in agricultural chemistry', by Prof. R. L. Wain.  
R.S.—London: Burlington Hse., 4.15 p.m. Election of fellows, followed by reading of original papers.  
S.C.I. & R.I.C.—Liverpool: Carbett Park Coll. of Further Ed., Eastham, 7.30 p.m. 'Rocket propellants', by C. H. Johnson.  
S.C.I. with I.Chem.E.—Newcastle: Stephenson Bldg., King's Coll., 6.30 p.m. 'Tonnage oxygen production', by Dr. P. M. Schifton.

### FRIDAY 17 MARCH

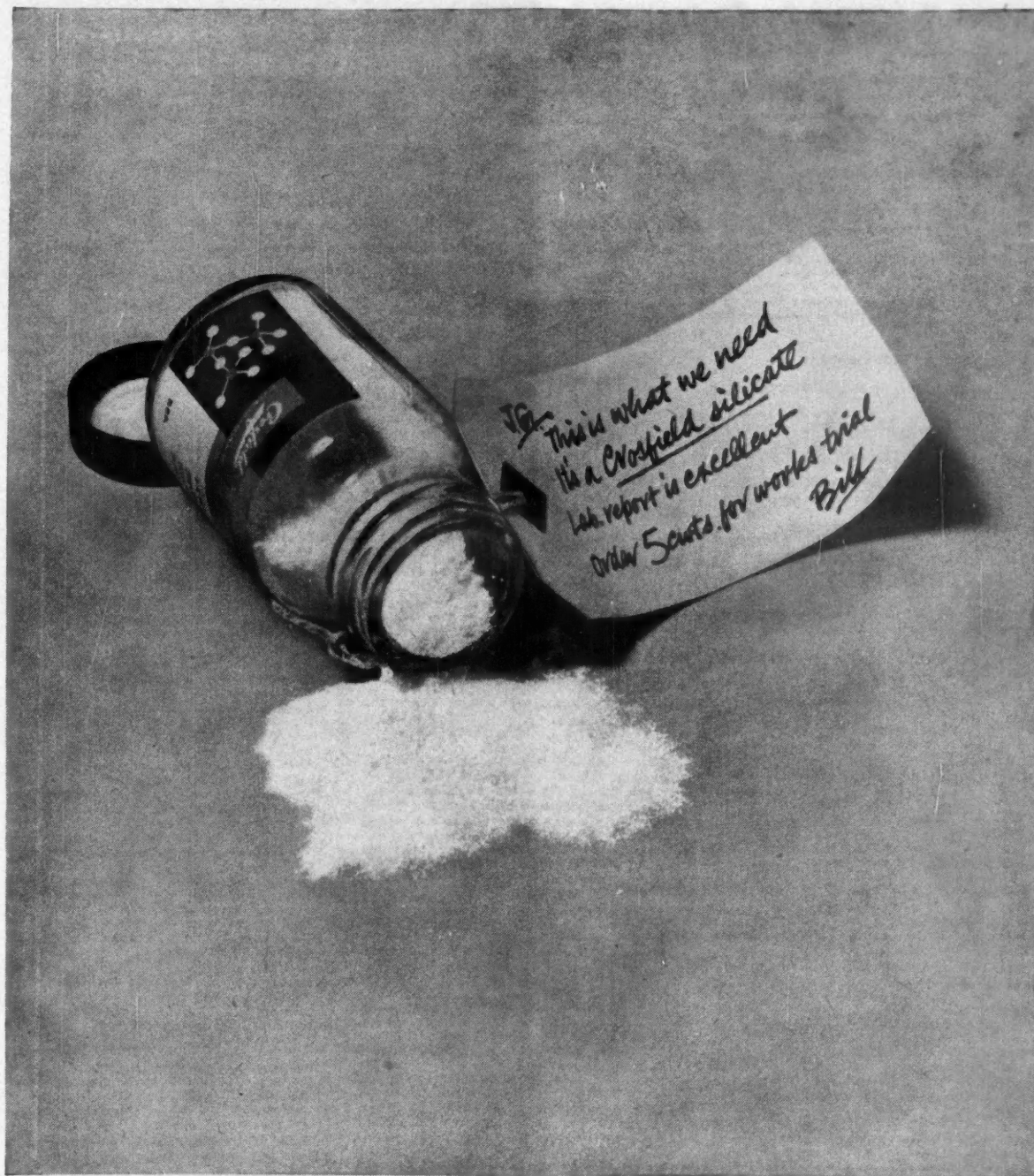
C.S.—Glasgow: Univ. Chem. Dept. Meeting for reading of original papers, Glasgow Section a.g.m.  
Plastics Inst.—Birmingham: James Watt Mem. Inst., 6.30 p.m. 'A critical assessment of the newer thermoplastics', by J. J. Millone & J. H. Postons.  
R.I.—London: 21 Albemarle St., W.1, 9 p.m. 'Magnetism and chemical architecture', by Prof. R. S. Nyholm.  
S.C.I.—Exeter: Univ., Washington Singer Labs., 4.30 p.m. S.W. Section a.g.m.; Forensic science', by Dr. F. D. M. Hocking.  
S.C.I.—London: 14 Belgrave Sq., S.W.1, 6.30 p.m. 'Use of nuclear magnetic resonance in determination of chemical structure', by Dr. L. M. Jackman.  
S.C.I.—Seascale: Windscale Club, 8 p.m. 'New horizons in polymer science', by Prof. C. E. H. Bawn.  
Soc. Water Treatment & Exam.—London: Royal Soc. Health, 90 Buckingham Palace Rd., S.W.1, 9.30-5.30 p.m. Ninth a.g.m. followed by symposium on 'Application of laboratory & pilot plant studies to full scale water effluent treatment'.

### SATURDAY 18 MARCH

S.A.C.—Luton: Tech. Coll., 6.30 p.m. 'Some newer reagents in analytical chemistry', by Prof. R. Belcher.

### Cost Engineers' Second Meeting

Second public meeting of the British Group of the American Association of Cost Engineers will be held at the Institution of Civil Engineers on 10 March at 5.45 p.m. An address on 'Air-cooled heat exchangers' will be delivered by Mr. R. J. Anderson of the Hudson Engineering Corporation. Written enquiries should be addressed to Mr. T. B. Woods, hon. secretary, 32 Spring Close, Sherborne St. John, Basingstoke, Hants.



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R.S.—London: Burlington Hse., 4.15 p.m. Election of fellows, followed by reading of original papers.  
S.C.I. & R.I.C.—Liverpool: Carbett Park Coll. of Further Ed., Eastham, 7.30 p.m. 'Rocket propellants', by C. H. Johnson.  
S.C.I. with I.Chem.E.—Newcastle: Stephenson Bldg., King's Coll., 6.30 p.m. 'Tonnage oxygen production', by Dr. P. M. Schifton.

## FRIDAY 17 MARCH

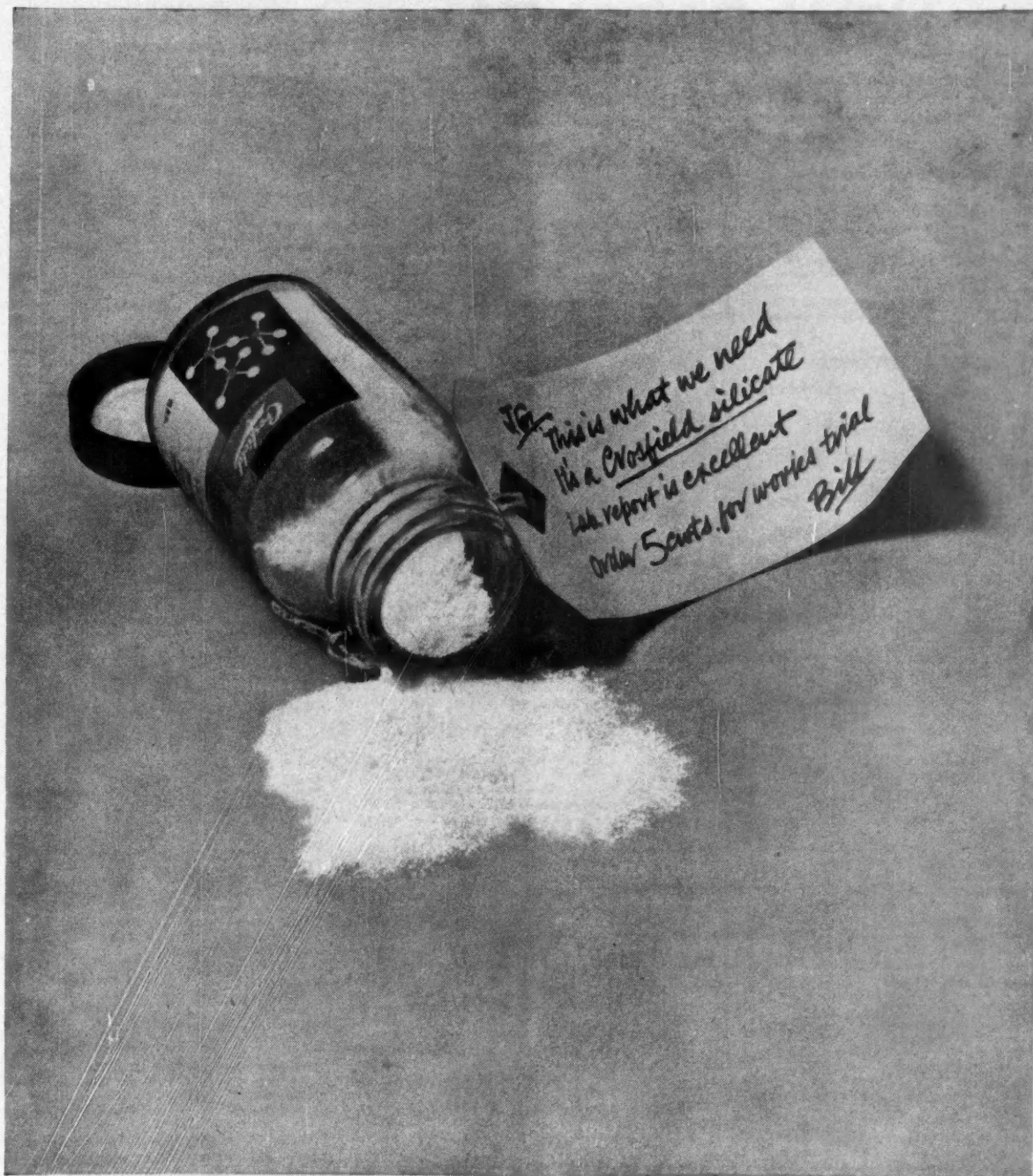
C.S.—Glasgow: Univ. Chem. Dept. Meeting for reading of original papers, Glasgow Meeting a.g.m. Plastics Inst.—Birmingham: James Watt Mem. Inst., 6.30 p.m. 'A critical assessment of the newer thermoplastics', by J. J. Millone & J. H. Postons.  
R.I.—London: 21 Albemarle St., W.1., 9 p.m. 'Magnetism and chemical architecture', by Prof. R. S. Nyholm.  
S.C.I.—Exeter: Univ., Washington Singer Labs., 4.30 p.m. S.W. Section a.g.m.; Forensic science', by Dr. F. D. M. Hocking.  
S.C.I.—London: 14 Belgrave Sq., S.W.1., 6.30 p.m. 'Use of nuclear magnetic resonance in determination of chemical structure', by Dr. L. M. Jackman.  
S.C.I.—Seascale: Windscale Club, 8 p.m. 'New horizons in polymer science', by Prof. C. E. H. Bawn.  
Soc. Water Treatment & Exam.—London: Royal Soc. Health, 90 Buckingham Palace Rd., S.W.1., 9.30-5.30 p.m. Ninth a.g.m. followed by symposium on 'Application of laboratory & pilot plant studies to full scale water effluent treatment'.

## SATURDAY 18 MARCH

S.A.C.—Luton: Tech. Coll., 6.30 p.m. 'Some newer reagents in analytical chemistry', by Prof. R. Belcher.

## Cost Engineers' Second Meeting

Second public meeting of the British Group of the American Association of Cost Engineers will be held at the Institution of Civil Engineers on 10 March at 5.45 p.m. An address on 'Air-cooled heat exchangers' will be delivered by Mr. R. J. Anderson of the Hudson Engineering Corporation. Written enquiries should be addressed to Mr. T. B. Woods, hon. secretary, 32 Spring Close, Sherborne St. John, Basingstoke, Hants.



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# NEW PATENTS

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Specifications filed in connection with the acceptances in the following list will be open to public inspection on the dates shown. Opposition to the grant of a patent on any of the applications listed may be lodged by filing patents form 12 at any time within the prescribed period.

## ACCEPTANCES

### Open to public inspection 12 April

- Method for separating substances with different molecular sizes from a solution. Pharmacia A.B. **865 265**  
Co-ordinating resins. Imperial Chemical Industries Ltd. **865 331**  
Method for preparing epoxyresins. Koninklijke Zwavelzuur-Fabrieken Voorheen Ketjen N.V. **865 332**  
Production of titanium. New Jersey Zinc Co. **865 266**  
Preparation of cyanogen. Pure Oil Co. **865 333**  
Coating compositions containing cellulose derivatives. Du Pont de Nemours & Co., E.I. **865 267**  
Production of yellow dye images by colour development. General Aniline & Film Corp. **865 032**  
Method for attaching a composition metal-ceramic material to a backing member. Bendix Corp. **865 282**  
Process for coating metals and compositions useful therein. Dow Chemical Co. **865 304**  
Isomerisation of paraffinic hydrocarbons. Esso Research & Engineering Co. **865 269**  
Epoxidation. Henkel & Cie GmbH. **865 271**  
N-(propynyl)-2-(thiazole) sulphonamides. Firestone Tire & Rubber Co. **865 334**  
Fluorine-containing organosilicon compounds. Midland Silicones Ltd. **865 335**  
Methods of manufacturing liquids having lubricating properties and in liquids obtained by said methods. Office National d'Etudes et de Recherches Aeronautiques O.N.E.R.A. **865 338**  
Compounds of the lactone type. Shell International Research Maatschappij N.V. **864 925**  
Process and apparatus for producing unsaturated hydrocarbons. Zimmer, H. J. [trading as Zimmer Verfahrenstechnik, H. J.]. **865 336**  
Process and means for cracking heavy oils into unsaturated hydrocarbons. Zimmer, H. J. [trading as Zimmer Verfahrenstechnik, H. J.]. **865 307**  
Rubbery polymers. Phillips Petroleum Co. **865 337**  
Epoxy compounds. Ciba Ltd. **865 340**  
5-Benzene-sulphonamido-1-phenyl pyrazole derivatives. Farbenfabriken Bayer AG. **865 341**  
Process for the production of boron hydride hydrocarbon compounds. Farbenfabriken Bayer AG. **865 342**  
Antiknock fluid. Ethyl Corporation. **865 343**  
Cells for the electrolysis of hydrochloric acid or aqueous solutions of chlorides. Badische Anilin- & Soda-Fabrik AG. [Addition to 839 275]. **865 288**  
Method for the production of citrates. Benckiser Gesellschaft Chemische Fabrik, J. A. **865 309**  
Rubber scorch inhibitors and retarders. Good-year Tire & Rubber Co. **865 289**  
Process for the production of 2-cis-11-ionylidene acetic acid. Farbenfabriken Bayer AG. **865 310**  
Process for the production of acrylamide. Henkel & Cie GmbH. **865 290**  
Production of gases containing sulphur dioxide. Badische Anilin- & Soda-Fabrik AG. **865 291**  
Method of producing *ortho*-(bis (4, 4'-hydroxyphenyl)-methyl)-benzyl alcohol. Iromedica AG. **865 292**  
Process for recovering resin formers and resins from the evaporator residue of the refining pressure-hydrogenation of benzene hydrocarbons. Gelsenkirchener Bergwerks-AG. **865 293**  
Process for continuous resolution of racemic amino acids. Ajinomoto Co. Inc. **865 311**

- Production of cyanuric acid and alkali metal cyanurates. Badische Anilin- & Soda-Fabrik AG. **865 294**  
Substituted morpholinopropylamines and their use as corrosion inhibitors. General Mills Inc. **865 312**  
Steroids and process for preparation thereof. Ayerst, McKenna & Harrison Ltd. **865 004**  
Coumarin derivatives. Francesco Vismara S.p.A. **865 313**  
Method of deodorising gases. National Lead Co. **865 296**  
Process for preparing compounds of the lactone type. Shell Internationale Research Maatschappij N.V. [Addition to 864 925]. **864 926**  
Polyalphaolefin butyl rubber blend. Esso Research & Engineering Co. **865 297**  
Purification of mono-olefins by selective hydrogenation. Esso Research & Engineering Co. **865 299**  
Method of preparing acetaldehyde polymers. Zaidan Hojin Nihon Kagaku Seni Kenkyusho. **864 997**  
Production of acrylonitrile. Du Pont de Nemours & Co., E. I. **865 040**  
Process for the production of terphenyls. Montecatini Soc. Generale per l'Industria Mineraria e Chimica. **865 302**  
Grafting of cellulose acetate. Rhone-Poulenc **865 263**  
Detergents. Marchon Products Ltd. [Divided out of 865 207]. **865 209**

### Open to public inspection 19 April

- Resin-sand mixes for moulding. Leicester, Lovell & Co. Ltd. **865 377**  
Chlorinated polymers. T.I. (Group Services) Ltd. **865 378**  
Methods of joining graphite to graphite and graphite to metal surfaces. General Electric Co. Ltd. **865 592**  
Method of bonding ethylene polymers or copolymers to elastomers. Dunlop Rubber Co. Ltd. **865 806**  
Polymerisation of ethylene. Distillers Co. Ltd. **865 407**  
Acrylate synthesis. Minnesota Mining & Manufacturing Co. **865 379**  
Oil stain resistant colour coated mineral granules. Minnesota Mining & Manufacturing Co. **865 392**  
Fluorinated compounds and process for making such compounds. Minnesota Mining & Manufacturing Co. **865 858**  
Method of manufacturing artificial fibres. Rasmussen, O. B. **865 707**  
Aminobenzene sulphonamide. Ciba Ltd. **865 708**  
Process for the removal of organic impurities in a contact sulphuric acid process. Chemiebau Dr. A. Zieren GmbH. **865 711**  
Antiseptic therapeutic compositions comprising 2:4 dichlorobenzyl alcohol. Boots Pure Drug Co. Ltd. **865 672**  
Self-hardening alkali- and acid-resistant water glass cements capable of swelling. Farbenwerke Hoechst AG. **865 060**  
Process for the reduction of alumina. Pechiney Compagnie de Produits Chimiques et Electrometallurgiques. **865 061**  
Process and apparatus for the electrolytic production of metallic titanium. Egami, I. **865 712**  
Manufacture of trialkyl phosphites. Ciba Ltd. **865 454**  
Process for obtaining pure polyalkylene derivatives. Ciba Ltd. **865 420**  
Protective coatings for polyester resins. Hooker Chemical Corp. **865 408**  
Fluid flame-resistant compositions. Farbenwerke Hoechst AG. **865 381**  
Phosphorus compounds, their methods of preparation and their use in fireproofing. Compagnie Francaise des Matieres Colorantes. **865 396**  
Polyethylene terephthalate solutions. Chemstrand Corp. **865 869**  
Process and apparatus for carrying out chemical reactions at high temperatures. Farbenwerke Hoechst AG. [Addition to 834 419]. **865 397**  
Process for preparing a camphane derivative. Lepetit S.p.A. **865 862**  
Method for the purification of hydrogen peroxide. Columbia-Southern Chemical Corp. **865 398**  
Metal complexes of monoazo dyes and their production. Badische Anilin- & Soda-Fabrik AG. **865 410**

- Process for the production of heavy water. Ruhrchemie AG, and Stenckholm-Elektrizitaet AG. **865 411**  
Process for the production of vinylchloride polymers by dispersion processes in aqueous media. Wacker-Chemie GmbH. **865 399**  
Process for the manufacture of poly-fluoro-chloro carboxylic acids. Farbwerke Hoechst AG. **865 722**  
Process for preparing hydroxylated acrylates and methacrylates. Rohm & Haas Co. **865 664**  
Steroids and the manufacture thereof. Upjohn Co. **865 673**  
Separation of gaseous mixtures. Air Products Inc. **865 660**  
Acrylated  $\alpha$ ,  $\omega$ -dioxy-diamino anthraquinones, their manufacture and use. Ciba Ltd. **865 809**  
Heterocyclic nitrogen compounds and their use. Geigy AG, J. R. **865 675**  
Manufacture of polyurethane products. Imperial Chemical Industries Ltd. **865 637**  
Method of producing ammonium sulphate. Koppers GmbH, H. **865 676**  
Acrylonitrile copolymer solutions. Courtaulds Ltd. [Addition to 796 294]. **865 814**  
Organopolysiloxane elastomer compositions. Imperial Chemical Industries Ltd. **865 815**  
Aclaminoanthraquinones and process for their manufacture. Ciba Ltd. **865 816**  
Purification of phenol. Distillers Co. Ltd. **865 677**  
Phthalocyanine dyestuffs, their manufacture and use. Ciba Ltd. **865 679**  
Process for dyeing cellulose-containing materials, using dyestuffs containing arylurethane groups. Cassella Farbwerke Mainkur AG. **865 681**  
Polysiloxanes. Farbenfabriken Bayer AG. **865 771**  
Water-soluble basic resins containing nitrogen and their use. Geigy AG, J. R. **865 686**  
Esters of *p*-*tert*-butyl-cyclohexanol and preparation thereof. Van Ameringen-Haebler Inc. **865 819**  
Solvent compositions, and solutions of copolymers of vinyl chloride and vinyl acetate dissolved in such solvent compositions. American-Marietta Co. **865 688**  
Synthetic resins. Beck & Co. GmbH. **865 689**  
Manufacture of polymeric materials. Imperial Chemical Industries Ltd. **865 616**  
Polyurethane foams. Pfizer & Co. Inc., C. **865 777**  
Process for the manufacture of plastics from polyhydroxy compounds and polyisocyanates. Farbenfabriken Bayer AG. **865 726**  
Resins. Hercules Powder Co. **865 727**  
Cleaning and phosphate coating of metallic surfaces. Pyrene Co. Ltd. **865 497**  
Catalytic recombination of oxygen and hydrogen and/or deuterium in thorium oxide slurries. United States Atomic Energy Commission. **865 729**  
Process for the production of alkynols and alkynediols. Knapsack-Griesheim AG. **865 831**  
Process and apparatus for separating phosphorus from gases. Knapsack-Griesheim AG. **865 731**  
Hydroxy-quinones. Ciba Ltd. **865 808**  
Cracking or gasifying hydrocarbons. Hilgers, G. **865 732**  
Process for the production of aminobenzoic acid derivatives and their use in pest control. Geigy AG, J. R. **865 735**  
Cross-linking of polyethylene polypropylene and copolymers thereof. Hercules Powder Co. **865 793**  
Manufacture of alkyl nitrates from alkenes. Imperial Chemical Industries Ltd. **865 650**  
Purification of gases. Sulzer Freres S.A. **865 870**  
Polymerisation of vinyl monomers. Goodrich Co., B. F. **865 651**  
Process for the extraction and recovery of aromatic hydrocarbons from a liquid hydrocarbon mixture. Shell Internationale Research Maatschappij N.V. **865 698**  
Preparation of dihydrosesoxystreptomycin. Rhone-Poulenc. **865 873**  
Process and apparatus for carrying out chemical reactions at high temperatures. Farbenwerke Hoechst AG. [Addition to 834 419]. **865 373**  
Hardenable epoxy resin compositions. General Mills Inc. **865 656**  
Methods of utilising waste liquors obtained in the production of acrylates and methacrylates. Soc. d'Electro-Chimie d'Electro-Metallurgie et des Acieries Electriques d'Ugine. **865 657**  
Isomerisation of internal olefins. Purdue Research Foundation. **865 738**  
Polyurethane casting compositions. Goodyear Tire & Rubber Co. **865 739**  
Method for the preparation of chlorine-containing organic phosphorus-nitrogen compounds. Benckiser Gesellschaft Chemische Fabrik, J. A. [Addition to 830 918]. **865 848**



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## Market Reports

### SULPHUR PRICE DOWN, BUT COPPER SULPHATE UP

**LONDON** Steady trading conditions have been reported from most sections of the industrial chemicals market and the movement of supplies against contracts, in the aggregate, has been fairly substantial. The satisfactory trend in export trade in chemicals has been confirmed by the published figures for January which show an increase over the same period a year ago. Prices for the most part are unchanged and steady, but copper sulphate 98/100% purity is dearer at £77/ton less 2% f.o.b. Liverpool.

The seasonal call for fertilisers continues to expand while conditions in the coal tar products market remain firm with creosote oils and cresylic acid in active request.

**MANCHESTER** Generally steady price conditions prevail. After ruling unchanged for several weeks, quotation for copper sulphate has moved up (see under 'London') and moderate shipping business in this material is reported.

Home users of bleaching powder and most other heavy chemicals are calling for good deliveries against contracts, and a moderate weight of new business has been placed on the market during the past week. The marked improvement in weather conditions resulted in increased activity in fertilisers.

**SCOTLAND** A fairly satisfactory week's trading can be reported from the Scottish market. Most of the usual day-to-day run of industrial chemicals continue to be demanded with a good steady flow for textiles. Deliveries against contracts are moving regularly with quantities fully maintained. Prices on the whole have remained steady although following a cut in the price of crude sulphur there has been a reduction in the price of ground and powdered grades. The movement in export chemicals is still satisfactory, while seasonal interest in agricultural chemicals is developing.

### Meeting on Safety with Air Separation Plant

Joint meeting of the Institution of Chemical Engineers and the Institution of Gas Engineers on 'Some factors in the safe operation of air separation plant' will now be held on Wednesday, 22 March, a day later than previously announced. Venue is the Royal Institution, London W.1, and the meeting will start at 2.30 p.m. The discussion will be opened by Dr. J. B. Gardner, M.I. Chem.E., research and development director, British Oxygen Engineering.

## Obituary

**Mr. J. Holt**, Fellow of the Society of Dyers and Colourists and sales manager of the Geigy Co. Ltd., died in Bury General Hospital on 27 February at the early age of 56. He was a student of the Manchester College of Technology and joined Geigy, then the Geigy Colour Co., in Manchester, as assistant in the textile laboratory in October 1921. When Geigy moved to National Buildings in the Parsonage he was in charge of the laboratory technical service.

Early in the war, while remaining in charge of the laboratory, he took over the supplies department and so became responsible for the allocation of dyestuffs under the stringent war-time regulations of the Government Dyestuffs Control. His success in this very difficult job was widely recognised. By the end of the war he had become textile sales manager, and afterwards he was largely instrumental in the setting up of the Geigy area office in Belfast to deal with business in the Irish Republic and Northern Ireland, hitherto covered from Glasgow.

**Sir Thomas D. Nicol, K.B.E.**, chairman of Tennants Consolidated Ltd., 69 Grosvenor Street, London W.1, died on 1 March. Sir Thomas was also former chairman of Barter Trading Corporation Ltd., and other companies of the Tennant Group.

## CLASSIFIED ADVERTISEMENTS

*Continued from page 424*

### WANTED

**WANTED FOR CASH:** Surplus DIESEL GENERATING SETS, DIESEL ENGINES and MARINE ENGINES. Up to 5,000 h.p. Top price paid. We dismantle and remove. Send details to—Messrs. Arnold, Feltham Road, Ashford, Middlesex. Phone Ashford, Middx. 3349.

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### SITUATIONS VACANT: continued

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#### 1. SENIOR LABORATORY TECHNICIAN ELECTRO CHEMIST

The duties entail the supervision and control of production plating and processing carried out in the Laboratory and to investigate and report on new developments in this field. Liaison with the Engineering and Production Processing Departments will be an important aspect of the work. Applicants should have a sound academic background and possess practical experience of electro-plating.

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The successful applicant will work as assistant to the Chemist in charge, but will be expected to work on his own initiative to a large degree.

Familiarity with modern techniques of electro-plating and metal finishing is essential, and a sound technical background necessary.

Salary for both posts will be commensurate with qualifications and experience.

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## EDUCATIONAL

### THE INSTITUTION OF CHEMICAL ENGINEERS 37th (1961) EXAMINATION

Application forms for entrance to the 1961 Examination, which should be returned not later than the 1st June 1961 (the 1st July for those taking Part 3 (The Design Problem only), may be obtained from the General Secretary, The Institution of Chemical Engineers, 16 Belgrave Square, London, S.W.1.

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Applications are invited for the appointment of a CHEMIST AND MICROBIOLOGIST to supervise and control a river water treatment plant, capacity 12 m.g.d.

Candidates must hold a Degree in Natural Science from a recognised University or equivalent qualification and must produce evidence of a thorough knowledge of Chemistry, Bacteriology and Biology as applied to water; have experience of water treatment by coagulation and chlorination methods and be conversant with the biology and management of storage reservoirs.

The duties of the officer appointed will include analysis of water samples at all stages of purification from the river to the distribution system and the daily control of the water-treatment plant.

The officer will be under the general direction of the Water Engineer and Manager who may allot such other analyses, investigations and duties from time to time.

The person appointed will be required to reside on the site, where housing accommodation will be provided at a rental of 15s. 0d. per week, plus rates.

The salary will be within Scale A of the National Joint Council's Scales (£1,365 to £1,565 per annum), according to qualifications and experience.

The whole of the candidate's time will be required to be devoted to the service of the Water Department.

The appointment will be subject to one month's notice on either side, to the National Scheme of Conditions of Service, and, being superannuable, will be subject to the passing of a medical examination.

Applicants should state age and give details of education, training, experience and present and previous appointments.

Applications, with copies of two recent testimonials, are to be received by the undersigned not later than 10 a.m. on Thursday, 30 March, 1961.

Canvassing a member of the City Council or any Chief Officer will be a disqualification.

**T. H. JONES, M.I.C.E.,**  
 Engineer and Manager.

Water Department,  
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Applications should be sent to the Secretary of the University by April 17th, 1961, and should include the names of three referees.

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*Continued on page 422*

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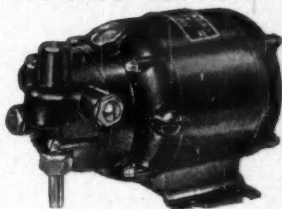
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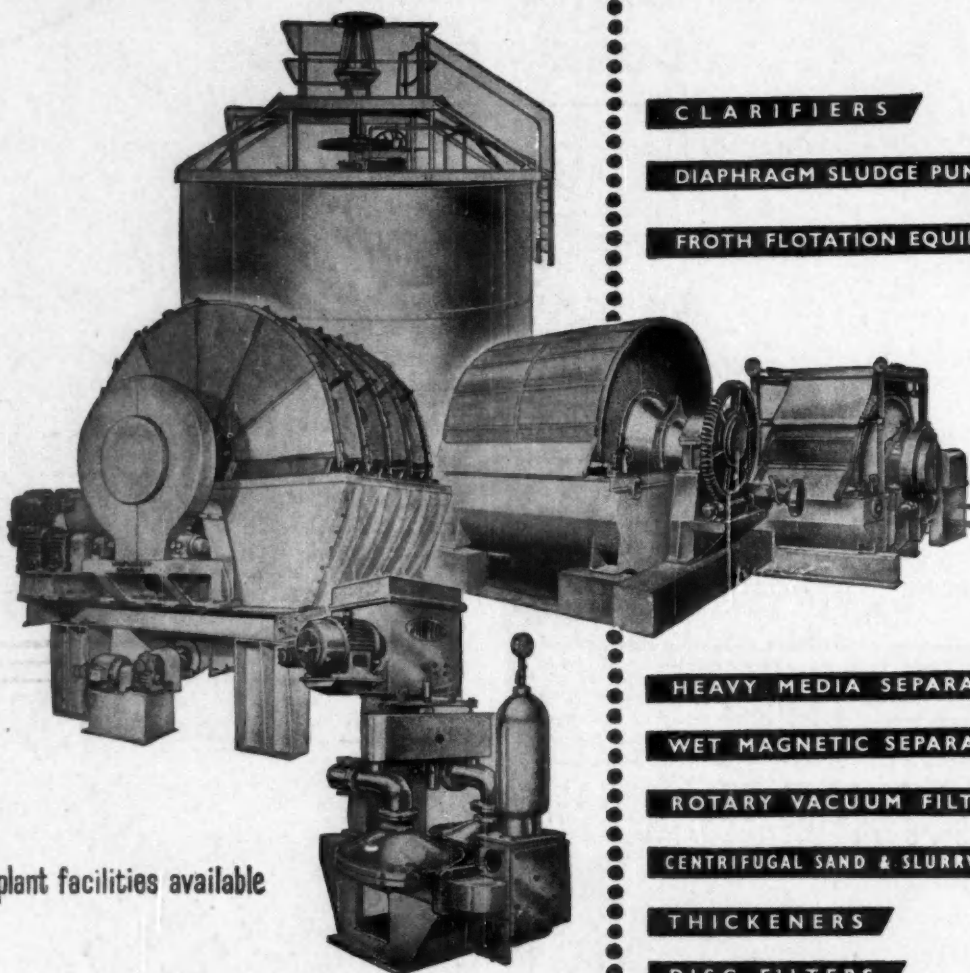
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